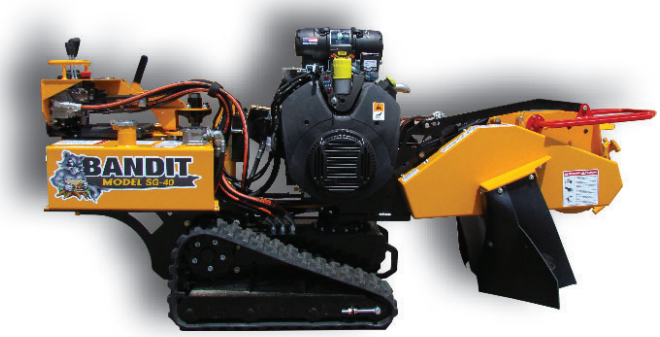
BANDIT STUMP GRINDERS

OPERATING & PARTS MANUAL

MODEL SG-40



Model No: SG-40

Serial No: _____

DEALER:

Name: _____

Address: _____

City/State: _____

Phone No: _____

Delivery Date: _____

Engine Make: _____

Serial No: _____

Clutch Make: _____

Model: _____ S/N _____

ATTENTION:

Depending on what replacement parts you are ordering, we will need the following information:

STUMP GRINDER COMPONENTS	ENGINE COMPONENTS
Serial Number	Brand
Model Number of Stump Grinder	Engine Serial Number
	Engine Model Number

Bandit INDUSTRIES, INC.
6750 Millbrook Rd. • Remus, MI 49340 • 1-989-561-2270

MANUFACTURED BY BANDIT INDUSTRIES, INC
PHONE: (989) 561-2270
PHONE: (800) 952-0178 IN USA
FAX: (989) 561-2273 ~ SALES DEPT.
FAX: (989) 561-2962 ~ PARTS/SERVICE
WEBSITE: www.banditchippers.com

CALIFORNIA PROPOSITION 65

⚠ WARNING ⚠ ADVERTENCIA

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- **Always start and operate the engine in a well-ventilated area.**
- **If in an enclosed area, vent the exhaust to the outside.**
- **Do not modify or tamper with the exhaust system.**
- **Do not idle the engine except as necessary.**

For more information go to:
www.P65warnings.ca.gov/diesel

Respirar gases de escape de motores diesel le expone a químicos conocidos por el estado de California como causales de cáncer y defectos congénitos u otros daños reproductivos.

- **Siempre encienda y opere el motor en áreas bien ventiladas.**
- **Si está en un área cerrada, ventile escape hacia el exterior.**
- **No modifique ni altere el sistema de escape.**
- **No deje el motor en ralentí a no ser que sea necesario.**

Para mayor información visite:
www.P65warnings.ca.gov/diesel

SPW-46 8/18

⚠ WARNING
⚠ ADVERTENCIA

Cancer and Reproductive Harm

Cáncer y daño reproductivo

www.P65warnings.ca.gov

SPW-47 8/18

WARRANTY VALIDATION FORM (STUMP GRINDER)

IMPORTANT - WARRANTY WILL BE DEEMED NULL AND VOID IF THIS FORM IS NOT FILLED OUT COMPLETELY AND ACCURATELY AND RETURNED TO THE CUSTOMER DATA DEPARTMENT WITHIN 10 DAYS OF EQUIPMENT DELIVERY

Customer Data Department
6750 Millbrook Road
Remus, MI, USA 49340
Phone: (800) 952-0178 in USA
Phone: (989) 561-2270
Fax: (989) 561-2273
Website: www.banditchippers.com

PURCHASER / OWNER INFORMATION:

Company Name _____ Contact Name _____

Mailing/Street Address _____ City _____

State _____ Zip Code _____ Country _____ Telephone Number (__) _____

E-mail _____ Machine Model No. _____ Date Put Into Service _____

Machine Serial No. _____ Machine Work Order No. _____ Machine Hours _____

Engine Make _____ Engine Serial No. _____ Machine Color _____

DEALER / SELLER INFORMATION:

Dealer/Seller Name _____ Contact Name _____

Mailing/Street Address _____ City _____

State _____ Zip Code _____ Country _____ Telephone Number (__) _____

1. _____ The customer has received instruction and fully understands all operational, safety and maintenance requirements of the equipment.

2. _____ The customer has received instruction and fully understands that everyone within 100 feet of the machine must wear proper personal safety equipment including hard hat, face shield, safety glass, gloves, ear protection and/or other items per OSHA and ANSI requirements.

3. _____ The customer has received instruction and fully understands the equipment maintenance schedules and procedures. The customer understands that it is their responsibility to perform scheduled maintenance that includes periodic relief valve adjustments, retightening all fasteners as needed, periodic cleaning of flow divider, clutch and belt adjustments, and other items.

4. _____ The customer has received instruction and fully understands not to reach near the cutter head with hands or feet or to be located near debris field with engine running.

5. _____ The customer has received instruction and fully understands that the operators must always be located within easy reach of all control and shut down devices.

6. _____ The customer has received instruction and fully understands to not start grinding a stump without checking for power lines, water lines, sewer lines, phone lines, etc.

7. _____ The customer has received instruction and fully understands the purpose of and how to operate the shut down/shut-off devices, and will not attempt to override any safety devices or guards.

8. _____ The customer has received instruction and fully understands that before performing any maintenance on the machine the ignition key must be removed, the cables must be completely disconnected from the battery, the cutter head must have come to a complete stop, and the cutter head lock must be installed. The customer understands they must allow the necessary time for the cutter head to come to a complete stop before opening the cutter head guard or start any maintenance or service procedures. If applicable the customer has received instruction and fully understands the purpose of the beltshield inspection hole and that they are never to attempt any maintenance or service procedures until visually confirming the belts have come to a complete stop.

9. _____ The customer has received instruction and fully understands the machine is not to be operated without the factory approved cutter head guard in place, the machine is not to be operated with any type of make shift cutter head guard, and the machine is not to be operated under any circumstances with the cutter guard open or unsecured.

10. _____ The customer has reviewed and fully understands limited warranty, and all written and visual instructions.

11. _____ The customer has received instruction and fully understands that warranty will not apply if the machine is operated with replacement parts or equipment not manufactured or recommended by Bandit Industries, Inc.

12. _____ The customer has received, been advised, and understands the manuals, and the Safety/Service video supplied with the grinder. A video is supplied for equipment models as available.

13. _____ All Danger, Warning and Operational decals are properly displayed on equipment and fully understood by customer.

14. _____ The customer has been instructed, understands, and agrees that all potential operators must: See the supplied video, be instructed on all the Danger, Warning and Operational decals, read the manual and follow the procedures.

I have inspected this equipment and find it in correct working condition. To the best of my knowledge, the customer and his/her personnel are aware of, and agree to the above procedures.

Signed: _____ **Date:** _____

(Dealer Representative)

The equipment has been thoroughly checked by the above named dealer representative, and I am satisfied with his/her instructions. I have also read, understand, and agree to reverse side of page.

Signed: _____ **Date:** _____

(Customer)

TO BE RETURNED AFTER THIRTY (30) DAYS OF OPERATION

DATE PURCHASE: _____

MODEL: _____

SERIAL NUMBER: _____

DEALER NAME: _____

_____

Please return to: Customer Data Department
6750 Millbrook Road
Remus, MI 49340

Phone: (800) 952-0178 in USA
Phone: (989) 561-2270
Fax: (989) 561-2273
Website:www.banditchippers.com

STUMP GRINDER / FORESTRY MOWER QUALITY REPORT

All of the employees that build your equipment strive to manufacturer the **very best quality** product on the market. We would appreciate your efforts in letting us know how we are doing.

We would like you to operate your machine for thirty (30) days and then fill out this questionnaire and mail it to us. This will help us to keep producing a good product and improving our products through your recommendations.

1. Did your machine perform to your expectations? _____
2. Was the machine delivered on schedule? _____
3. Was the paint color and finish to your satisfaction? _____
4. Was machine equipment as ordered? _____
5. Did all welds appear to be high quality? _____
6. Was the overall machine to your liking? _____
7. What problems have you experienced? _____
8. Have any components regularly loosened that caused problems? _____
9. Does the hydraulic system seem to have adequate power? _____
10. Is the machine manufactured to accommodate service in an adequate manner? If not, please explain:
    _____
11. General comments and/or suggestions: _____
    _____
    _____
12. Would you like to be contacted concerning more of our equipment? _____

YOUR COMPANY: _____

NAME: _____

ADDRESS: _____

CITY: _____

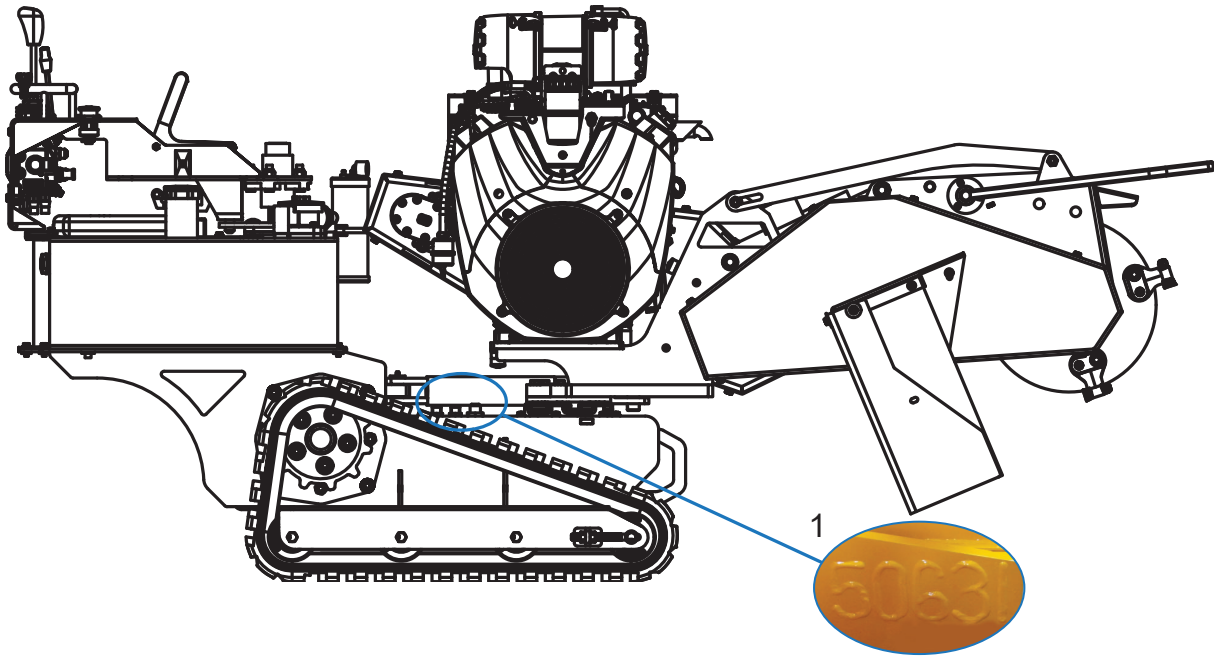
STATE & ZIP: _____

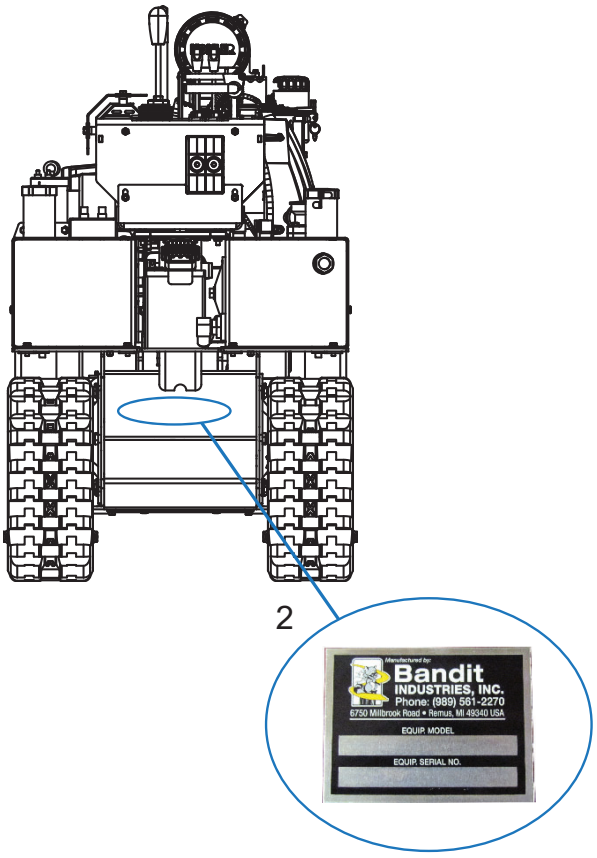
PHONE: (____) _____

E-MAIL: _____

TABLE OF CONTENTS

TYPICAL SERIAL NUMBER AND/OR WORK ORDER NUMBER LOCATIONS





1. Serial Number on top of frame near the bulkheads or between the tracks on the frame.
2. Work Order Number on top of frame near the bulkheads or between the tracks on the frame.

NOTICE

The engine information is located on the engine block.

INTRODUCTION

The purpose of this manual is to provide the user with specifications and procedures for the operation, maintenance and repair of this BANDIT product. As with any piece of equipment, safety should always be a constant thought while the machine is being operated, serviced or stored. In order to highlight this consideration, the material which addresses safety is proceeded by the following signal words:

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **WILL** result in death or serious injury (contains white letters on red background).

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **COULD** result in death or serious injury (contains black letters on orange background).

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **COULD** result in minor or moderate injury (contains black letters on yellow background).

NOTICE

NOTICE indicates information considered important, but not hazard related (contains white italic letters on blue background).

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS indicate general instructions relative to safe work practices and reminders of proper safety procedures (contains white italic letters on green background).

The equipment is designed and manufactured in accordance with the latest product industry standards. This alone does not prevent injury. It is the operator's responsibility to use good judgement and follow the warnings and instructions as indicated in this manual, on the machine and follow all safety standards per ANSI and OSHA instructions.

⚠ WARNING

Improper use of the product can result in severe personal injury. Personnel using the equipment must be qualified, trained and familiar with the operating procedures as defined in this manual, prior to operating the product.

⚠ WARNING

It is the responsibility of the owner or employer to ensure that the operator is trained and practices safe operation while using and servicing the machine. It is also the owner's responsibility to provide and follow a regularly scheduled preventative maintenance and repair program on the product, using only factory approved replacement parts. Any unapproved repairs or modifications may not only damage the machine and its performance, but could result in severe personal injury. Unapproved repairs or modifications will void warranty and eliminate manufacturer of any liability claims. Consult the equipment manufacturer with any questions.

Each machine is shipped with a manual, a customer's check sheet on the product, and any available parts & service manuals on component parts not produced by this manufacturer. Additional copies of these manuals and check sheets can be purchased from the manufacturer, or through the dealer. Engine parts, service and maintenance manuals MUST be purchased through the engine manufacturer or their dealer.

NOTICE

The producer of this Bandit product reserves the right to make any modifications or revisions to the design or specifications of its machine without advance notice. The producer also reserves the right to change machine and part prices as needed without advance notice.

SAFETY PROCEDURES

YOUR SAFETY IS VERY IMPORTANT TO US!

⚠ WARNING

Before operating the machine, you must have all potential operators read and follow manuals and decals, watch the video and follow the guidelines.

Read and follow all the instructions in this manual thoroughly. Your safety is dependent on your knowledge of how to operate and maintain this machine. You may obtain additional copies of this manual from your Bandit Dealer.

Always be cautious and careful when operating your equipment.

This equipment is intended for use by adults who have been properly trained and are physically capable of operating the machine safely. Never allow minors to operate this machine. Never operate any machine while under the influence of drugs or alcohol. Never operate equipment that is in need of repair or adjustment. Keep children, bystanders and animals clear of working area.

There must be at least two qualified and trained operators at the work site. They must be positioned in safe working locations, following safety procedures and instructions, and aware of each others whereabouts. There must, also, be at least two people on site during maintenance and service procedures in case an accident should occur.

This machine is equipped with safety decals, guards and designs for your protection.

Accidents are typically caused by making mistakes. The operator does not read the manual, overlooks safety decals, or fails to use lockouts provided for their safety. This occurs after the operator has become familiar with the machine. The operator is very cautious in the initial start up and operation because they do not understand the machine.

NOTICE

Before starting the machine, take a minute to check a few things. The machine should be in an area restricted from people passing by. This area around the machine must be free of all objects that can obstruct your movement when working with the machine. The machine should be checked for loose tools or foreign objects. All tools not in use should be secured in a tool box.

Operators must at all times be located within easy reach of all control and shut-off devices when the unit is running. They must be attentive and prepared to activate the devices.

⚠ DANGER

Torn or loose clothing is more likely to get caught in moving machinery parts. Keep such items as long hair, shirt sleeves, and shirt tails properly contained. Avoid wearing necklaces, rings, watches, and especially neckties while operating this machinery.

Wear all personal protection equipment (PPE) and follow all safety standards per ANSI and OSHA instructions. Examples of equipment: hard hat, face shield, safety glasses, gloves, ear protection, high visibility vest, and steel toe boots. Do not wear gauntlet or secured fit gloves. Always keep a fully charged fire extinguisher with the machine while operating or servicing the machine. Failure to do this will cause severe injury or death.

⚠ DANGER

Do not go near the rotating cutter wheel for any reason. Do not go near the cutter wheel while the engine is running or the cutter wheel is coasting to a stop. Contact with a rotating cutter wheel will result in severe injury or death.

Avoid moving parts. Keep hands, feet, and clothing away from power driven parts. Keep all guards and shields in place and properly secured. Contact with moving parts will result in severe injury or death.

Never sit, stand, lay, climb or ride anywhere on this machine while it is running, operating, or in transit. You will be injured.

Keep hands clear of all pinch points. Failure to do this will result in serious injury or death.

Do not start the engine with the clutch or cutter wheel engaged. Any debris may become a dangerous projectile. Contact with the rotating cutter wheel will result in serious injury or death.

Do not operate this machine indoors. Exhaust fumes can be fatal.

Never refuel while the machine is running. Never refuel in the shop or building. Always refuel in a well ventilated area, away from sparks or open flames. Do not smoke while refueling. Extinguish all smoking materials. Wipe up all spilled fuel before restarting the engine.

SAFETY PROCEDURES

⚠ DANGER

Do not start to grind a stump unless you are completely sure there are not any utility lines in the area above or below the ground level where you are grinding. Always contact the utility locating service in your area or local utility companies to mark underground utility lines. Failure to do so will result in severe injury or death.

Make sure everyone is clear of machine before moving the machine. Stay clear of undercarriage travel system when the machine is moving. Contact with the undercarriage travel system will cause severe injury or death.

⚠ WARNING

Do not work on the machine if the engine is running with the clutch or cutter wheel disengaged. Severe injury or death may occur if the cutter wheel was engaged.

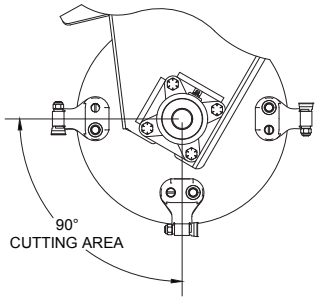
Do not go near or in-line with the debris field of the stump grinder while in operation. While grinding stumps, the chips and portions of the stump fly from the cutter wheel and can cause severe injury.

Do not go near hydraulic leaks. High pressure oil easily punctures skin causing serious injury, gangrene, or death. Avoid burns from fluid. Hot fluid under pressure can cause severe burns. Do not use fingers, skin, or bare hands to check for leaks. Use an object such as a piece of cardboard to find leaks. Lower load or relieve hydraulic pressure before loosening fittings. Relieve all pressure in the system before disconnecting the lines, hoses, or performing other work. Allow system to cool down to ambient temperature before opening any coolant or hydraulic oil system.

Clean machine of all debris. Do not leave this machine unattended until all potential fire debris is removed, no fire or smoldering exists, and hot spots are cold. The engine creates many hot spots including: exhaust manifold, exhaust, turbo (if equipped), etc. Remove all flammable debris such as wood, chips, leaves, oils, fuels, etc. from engine exhaust, engine turbo (if equipped), beside, around, and under engine, around and under tanks, inside belt shields and guards, inside battery and tool boxes, inside cabinets (if equipped), and anywhere materials collect. Always keep several type A:B:C fire extinguishers operational and on the job at all times.

Before performing maintenance on the machine remove all debris, oil, grease, water, snow, ice, etc. from all machine surfaces.

For optimum performance, the stump should be cut with the portion of the cutter wheel shown below. Never undercut the stump. Undercutting the stump may cause severe kickback, vibration and component damage. Never cut the stump from the top. The cutter wheel will throw debris up and toward the operator, instead of down and under the machine.



Do not touch hot machine surfaces. The machine surfaces may be hot due to the machine operating recently or the machine setting in the sunlight. Contact with hot machine surfaces may cause severe injury.

Never grind materials that might contain wires, stones, nails, or other metal objects which may damage the teeth. Damaged teeth and foreign objects may become dangerous projectiles and can cause severe injury or death. Remove all foreign objects from stump grinding area.

Sparks can occur if cutter teeth strike rocks, metal, or other hard objects. Do not use in high or very high fire hazard severity zones.

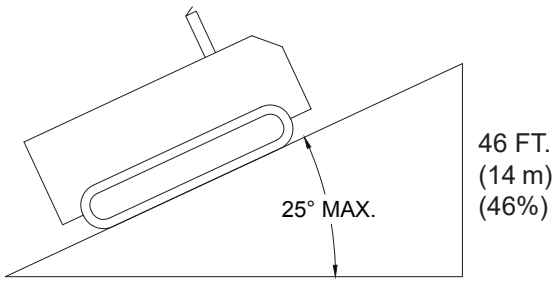
Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrester may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

SAFETY PROCEDURES

⚠ WARNING

Maximum Slope Grade

Ascending or Descending Slope



Side Slope

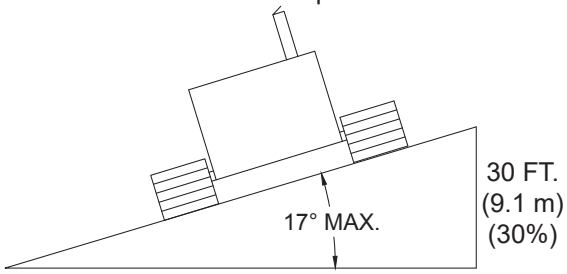


Diagram shows percentage to degree of slope. Percentage is in vertical feet for every 100 horizontal feet.

Do not attempt to operate the machine on an ascending or descending slope of more than 25° or 46% or a side slope of more than 17° or 30%, it is dangerous and could be fatal. This is the maximum slope grade the machine can be operated on if the hydraulic system, self propelled undercarriage, and engine are running at maximum performance and good traction is sustained.

Use extreme caution when traveling over non-level surfaces. This machine can tip over or tip backwards on non-level surfaces. You will cause engine damage, machine damage and possible personal injury or death.

The machine should never be parked on a slope at any time. The machine can coast or creep causing equipment damage and/or personal injury.

NOTICE

Do not attempt to start the engine or engage the cutter wheel on this machine if the cutter wheel is jammed or frozen in place. If you do, you will damage the cutter wheel drive system, which will not be covered under warranty and will cost you down time and money.

Engage and disengage the cutter wheel at idle. Failure to do this will damage the cutter wheel drive system.

Any increase from the specified maximum operating angles may cause loss of lubrication function and damage the engine.

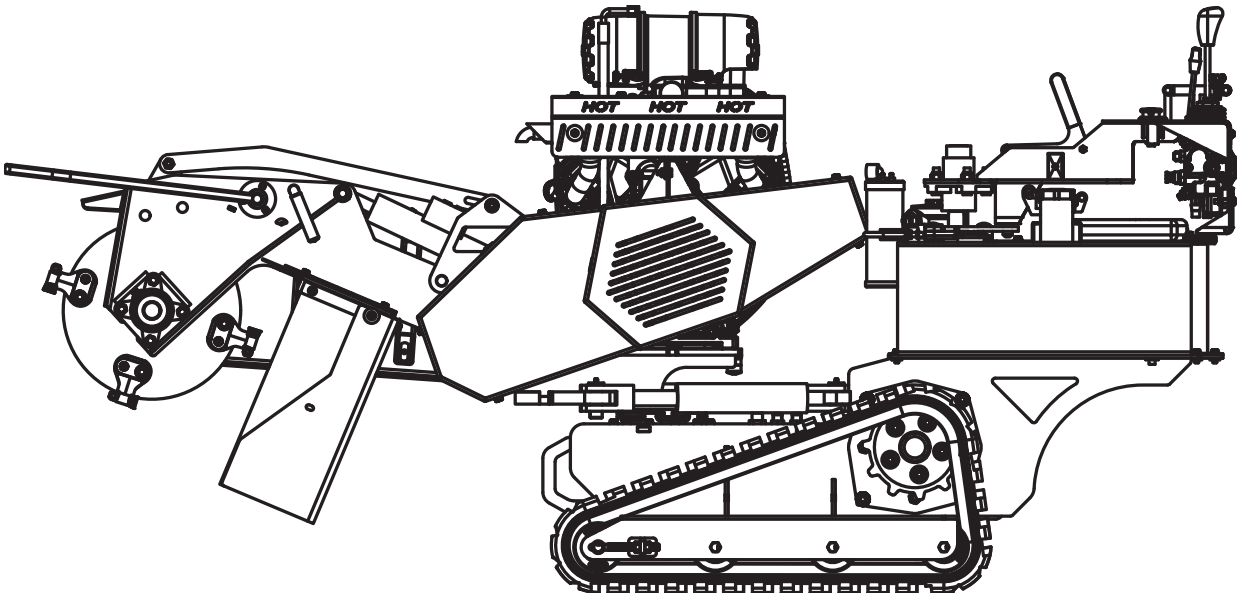
Keep the machine in good condition. Be sure the machine is in good operating condition and that all safety devices, including guards and shields are installed and functioning properly. Visually inspect the machine daily before starting the machine. Refer to the “Daily Start Up & Maintenance”. Do not make any modifications to your equipment unless specifically recommended or requested by Bandit Industries Inc.

Do not continue to operate the machine if the cutter wheel stalls. Immediately lift cutter wheel out of the stump, dirt, etc. and start again with less bite. Prolonged cutter wheel stall will ruin the cutter wheel drive system, creating extreme heat and possible fire hazard.

SAFETY INSTRUCTIONS

Before attempting any type of maintenance, disengage clutch or cutter wheel engagement, wait for the cutter wheel to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, disconnect the battery, and install the cutter wheel lock pin.

EQUIPMENT SPECIFICATIONS

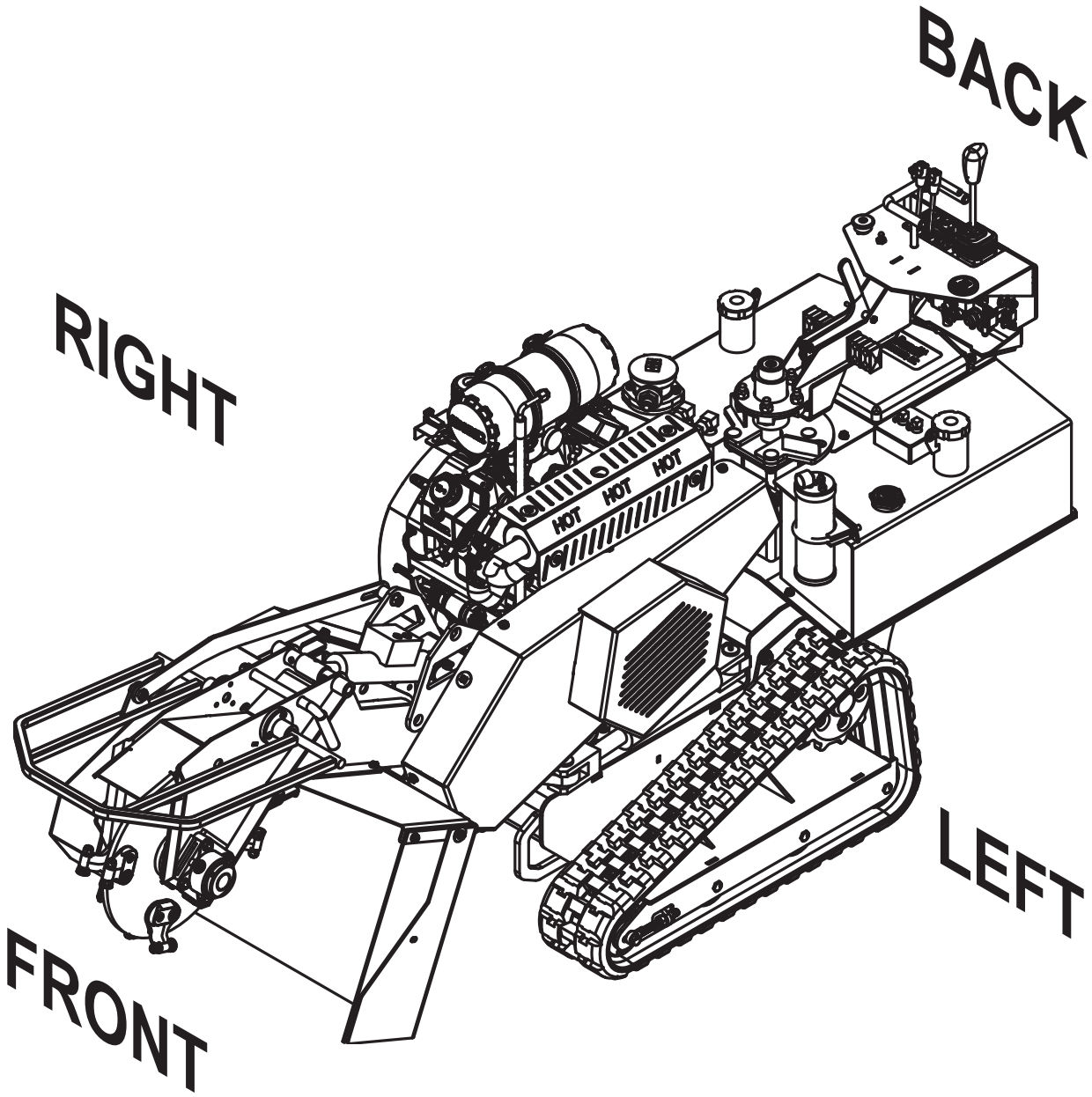


Approximate Dimensions & Weights

(Dimensions & Weights will vary depending on optional equipment)

SG-40	
Height	48” (1.2 m)
Length	101” (2.5 m)
Width	29” (0.7 m)
Weight	1600 lbs. (726kg)
Cutter Wheel Height	22” (0.6 m)
Cutter Wheel Depth	12” (0.3 m)
Cutter Wheel Swing	47” (1.2 m)
Cutter Wheel Diameter	18” (0.5 m)
Number of Teeth	8
Fuel Tank Capacity	7 gal. (26L)
Hydraulic Tank Capacity	7 gal. (26L)

MACHINE ORIENTATION REFERENCE



ENGINE OPERATING SPEEDS

NOTICE

Refer to the Completion/Check Sheet, that is shipped with the machine for the correct engine RPM. If needed, contact your local dealer or Bandit Industries.

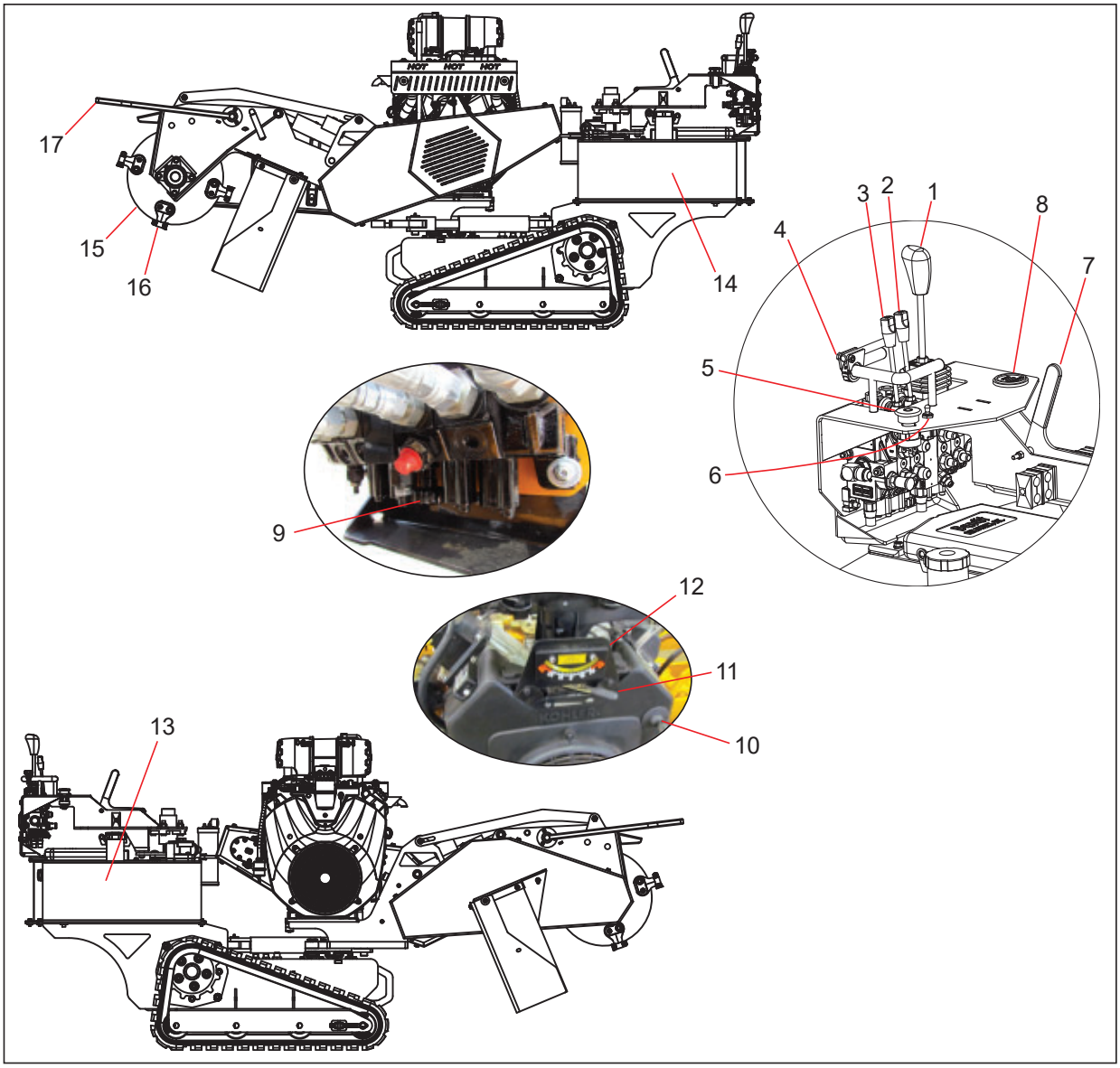
Some Current Engine Types	Maximum RPM
Kohler CH980 38 Hp EFI	3600

CONTROLS & COMPONENTS

Basic Location of Controls & Components

#	Control
1	Cutter Wheel Up/Down & Swing Left/Right
2	Left Track Forward/Reverse
3	Right Track Forward/Reverse
4	Reverse Limiter
5	Emergency Stop Button
6	Cutter Wheel On/Off Switch
7	Swing Out Console Lock
8	Tach/Hour Meter
9	Swing Speed Control

#	Control
10	Ignition Switch
11	Throttle Up/Down Lever
12	Level Gauge
13	Hydraulic Tank
14	Fuel Tank
15	Cutter Wheel
16	Cutter Wheel Teeth
17	Cutter Wheel Bar



CONTROLS

1. **A. Cutter Wheel Up/Down:** To move the cutter wheel up; pull the joystick on the valve bank towards the back of the machine. To move the cutter wheel down; push the joystick on the valve bank towards the front of the machine.
   B. Swing Left/Right: To move the cutter wheel to the left; push the joystick on the valve bank towards the left side of the machine. To move the cutter wheel to the right; push the joystick on the valve bank towards the right side of the machine.
2. **Left Track Forward/Reverse:** To move the left track forward; push the handle on the valve bank labelled "L.Track Forward" towards the front of the machine. To reverse the left track; pull the handle on the valve bank labelled "L. Track Reverse" towards the back of the machine.
3. **Right Track Forward/Reverse:** To move the right track forward; push the handle on the valve bank labelled "R. Track Forward" towards the front of the machine. To reverse the right track; pull the handle on the valve bank labelled "R. Track Reverse" towards the back of the machine.
4. **Reverse Limiter:** Leave the reverse limiter closed if the engine is at full rpm. If the engine is at idle or low rpm, the reverse limiter can be opened to move or reposition the machine.
5. **Emergency Stop Button:** When the emergency stop button is pressed the entire machine will shut down. The cutter wheel will not stop immediately stop, it will coast to a stop.
6. **Cutter Wheel On/Off Switch:** Before turning the cutter wheel on, make sure the engine is at low idle. Flip the switch to the "On" position, then throttle the machine up.
7. **Swing Out Console Lock:** To change the swing out position, pull the swing out console lock handle towards the back of the machine and move the console swing arm to the left or right side, and release the handle. Continue to move the console swing arm until it locks into place.
8. **Tach/Hour Meter:** The tach/hour meter keeps track of the amount of hours on the machine.
9. **Swing Speed Control:** To control the swing speed so the swing speed is increased, loosen the swing speed valve. To control the swing speed so the swing speed in decreased, tighten the swing speed valve.
10. **Ignition Switch:** To start the machine, insert the ignition key, and turn towards the front of the machine. To turn the machine off, turn the key to the back of the machine, and remove the key.
11. **Throttle Up/Down Lever:** To throttle the machine up move the lever to the high RPM symbol. To throttle the machine down move the low RPM symbol.

NOTICE

Refer to engine manufacturer's manual for specific engine controls and operation.

MACHINE OPERATION

⚠ DANGER

Do not start to grind a stump unless you are completely sure there are not any utility lines in the area above or below the ground level where you are grinding. Always contact the utility locating service in your area or local utility companies to mark underground utility lines.

Keep clear of cutting wheel, moving machine parts and grinder debris field.

⚠ WARNING

Wear all personal protective equipment per ANSI, OSHA and manuals.

NOTICE

The stump must be cut as low to the ground as possible to reduce the amount of grinding material, debris, and lessen the chance of flying debris in the work area.

DO NOT operate machine with extremely worn or broken teeth.

DO NOT operate machine without a full set of teeth. Operating the machine without a full set of teeth can cause excessive vibration and premature bearing failure.

Use only original equipment manufacturer's teeth. The use of any other aftermarket teeth may cause damage or premature failure to the drive train.

1. Before starting the machine check all fluids, and follow all daily maintenance procedures.
2. Make sure the lock pin is not in the frame lock hole or the cutter wheel lock hole.
3. Start the engine.
4. Test the following controls to make sure they function properly.
   a. Swing Left/Right
   b. Cutter Wheel Up/Down
   c. Travel Forward/Reverse
5. Make sure the machine is at low idle.
6. Engage the cutter wheel.
7. Throttle the machine up to ensure the cutter wheel rotates properly (if the cutter wheel does not rotate properly shut the machine down and diagnose the issue).
8. Throttle the machine down.
9. Disengage the cutter wheel.
10. Throttle the machine up.
11. Move the machine to the first stump.
12. Raise the cutter wheel above the stump.
13. Swing the cutter wheel all the way to the left and to the right to ensure there are no obstructions.
14. Make sure the cutter wheel is positioned on the right side of the stump.
15. Throttle the machine down.
16. Engage the cutter wheel.
17. Throttle the machine up.
18. Lower the cutter wheel to the stump and make a few light passes at the stump to get a feel for the cutting action.
19. Gradually increase the cutting action and work away at the stump by swinging the cutter wheel left-to-right-to-left through the stump in a side-to-side motion. The cutting actions should be smooth and effortless. If it is not either back the machine up or lift the cutter wheel up to take a smaller bite.
20. Continue cutting the stump by adjusting the cutter wheel progressively lower until the stump is cut well below ground level.
21. Raise the cutter wheel above the ground.
22. Swing the cutter wheel back to the right side of the stump.
23. Move the machine closer to the stump for the next series of passes and continue cutting.
24. Repeat steps 19 through 23 until the stump has been fully removed.
25. If working with a large stump, you may need to reposition the machine in order to fully remove the stump.
26. Repeat steps 8 through 25 until all required stumps are removed.
27. When all stumps are removed, return the cutter wheel to the center position
28. Insert the lock pin in the frame lock hole.
29. Load the machine according to the instructions in the Transportation Procedures.

MACHINE OPERATION

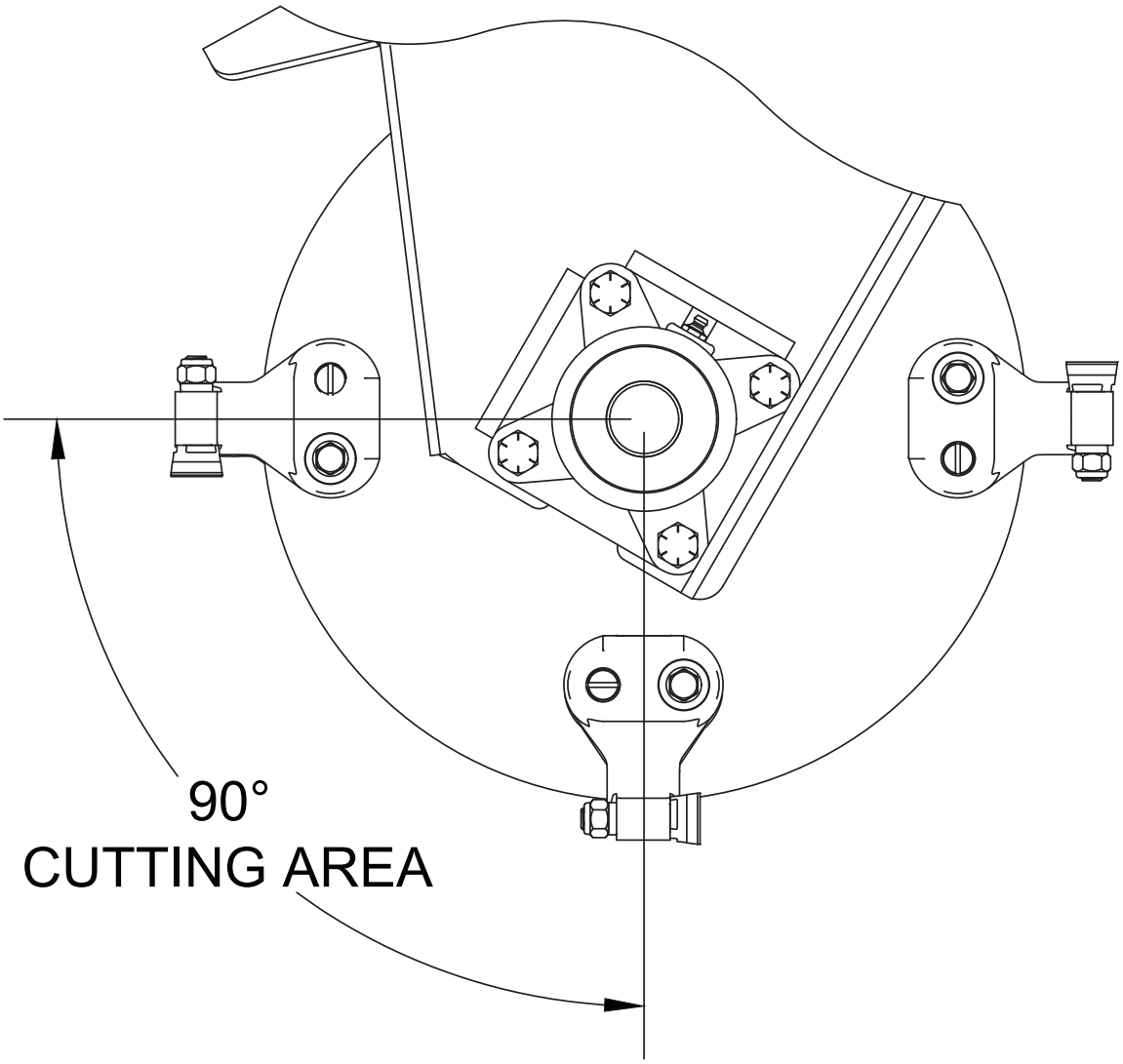
If the grinding material starts to interfere with the machine operation, follow the steps below before removing any grinding material. Never remove any grinding material with cutter wheel running. Contact with a rotating cutter wheel will result in serious bodily injury or death.

1. Disengage the cutter wheel.
2. Position the machine away from the stump.
3. Before attempting any type of maintenance, disengage clutch or cutter wheel engagement, wait for the cutter wheel to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, install the cutter wheel lock pin, wait 2 minutes then disconnect the battery.
4. Clear the grinding material away from the stump.
5. Start the machine and reposition it at the stump before engaging the cutter wheel.

CUTTING AREA

⚠ DANGER

For optimum performance, the stump should be cut with the portion of the cutter wheel shown below. Never undercut the stump. Undercutting the stump may cause severe kickback, vibration and component damage. Never cut the stump from the top. The cutter wheel will throw debris up and toward the operator, instead of down and under the machine.



LOADING & UNLOADING

⚠ WARNING

BEFORE LOADING OR UNLOADING THE MACHINE, INSPECT AND CONFIRM THE FOLLOWING STEPS: When loading or unloading the self-propelled machine on the trailer, use care and caution. The maneuvering of the equipment must be slow, smooth, and intentional, not fast and jerky.

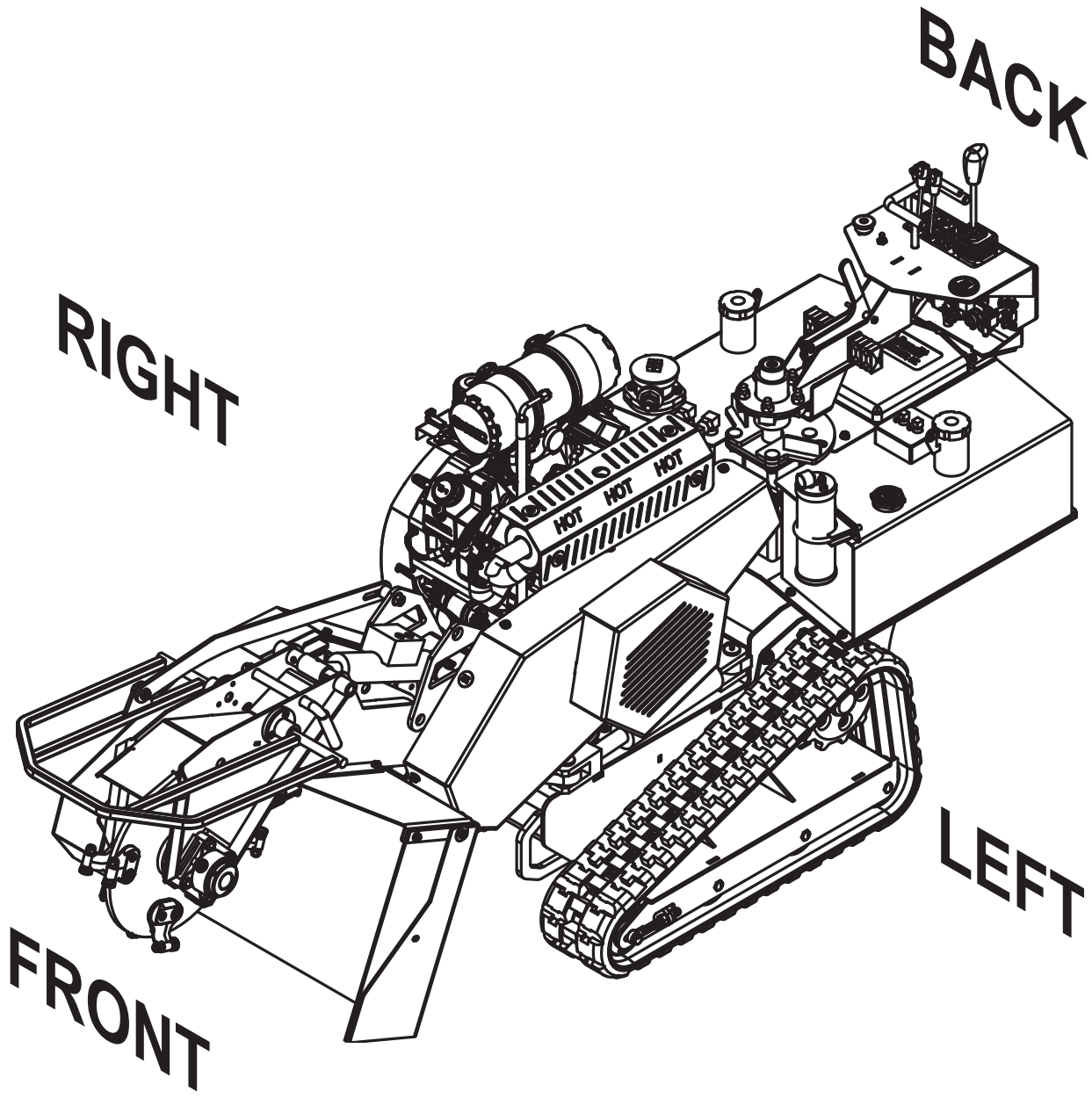
1. Make sure the trailer and towing vehicle are parked on a flat surface. They must be stable on the surface with the brakes locked and/or the wheels chocked to avoid unwanted movement.
2. Position the loading ramps or loading gate securely between the trailer and the ground level. Have them located so that they are in line with the tires or tracks of the machine when it moves.
3. Remove and store the chains and binders used for transporting.
4. Before loading or unloading the machine remove all debris, oil, grease, water, snow, ice, etc. from all trailer surface and loading ramp.
5. Confirm that there are not any obstacles on the trailer bed, around the trailer that may cause restricted movement of the machine or the operator.
6. The only person in the area should be the one that is operating the machine controls, and they should be very experienced with the controls on this machine.
7. If you are on streets, roads or public areas, position the warning cones etc, per your company's safety policy.
8. Check and make sure the frame lock pin is installed correctly. If the frame lock pin is not installed correctly, start up the machine and raise or lower the frame until the frame lock holes line up and install the frame lock pin.
9. Load or unload the machine on or off the trailer.
10. Follow the trailer manufacturer's recommendations for the amount of weight on the tongue or hitch according to the total machine package weight to correctly position the machine on the trailer bed.
11. Align the machine with the trailer bed, and the loading ramps. The only equipment movement should be slowly, straight on or straight off the trailer.
12. With the engine and the machine at as low of speed as possible, move the machine toward the ramp system. Make sure the alignment is correct throughout the travel and the cutter wheel clears obstacles as it is going up or down the ramp system.
13. Properly secure the equipment and the area to avoid any possible accidents or dangers.
14. The trailer should be constructed with appropriate chain down positions for the specific sized machine. You must have binders that will withstand the strain of the machine trying to move while it is being transported.
15. The loading ramps or loading gate of the trailer must be constructed to withstand the weight and forces involved in loading and unloading the machine.

TRANSPORTATION PROCEDURES

BEFORE TRANSPORTING THE MACHINE, INSPECT AND CONFIRM THE FOLLOWING STEPS

1. The trailer must have a cargo weight rating capacity for the weight of the stump grinder. The combined weight of the trailer and the stump grinder can not exceed the load capacity of the tires, axles, hitch coupler system or the GVWR (Gross Vehicle Weight Rating) of the trailer.
2. The towing vehicle must be rated for and have the towing capabilities to haul the stump grinder package (includes the stump grinder and a trailer). The towing vehicle must be mechanically sound and capable of handling the towing job.
3. The hitch on the towing vehicle and the coupler on the trailer must match in size, type, and needed capacity.
4. Make sure both the towing hitch and the coupler are in good mechanical and wear condition, that they are joined together securely, and the coupler/hitch is locked in place.
5. The safety chains must have the correct capacity for the equipment being towed.
6. The safety chains are crossed under the coupler/hitch then securely attached to the towing vehicle. The safety chains are long enough to not restrict the turning movement, but short enough to not drag on the road.
7. The electrical plug-in on the towing vehicle and the trailer must be wired for the same functions and they fit securely together. The plug-in wire is long enough to not restrict the turning movement, but short enough to not drag on the road. The trailer must have a lighting system and braking system to match and perform correctly off the towing vehicles system. You must meet the Federal and your States' Department of Transportation Code of Regulations concerning lights, brakes, and highway transit.
8. The break-away actuator (if equipped) that is installed on the trailer correctly works and is appropriately attached to the towing vehicle.
9. All lights and brakes on the trailer must correctly function when activated by the systems in the towing vehicle.
10. The tires must be checked for cuts or damaged rims, air pressure is correct, and the axle lug nuts have been checked for correct torque (refer to trailer manual).
11. When the stump grinder is on the trailer, the trailer must have the right load capacity, with the stump grinder positioned on the trailer for the correct weight distribution (follow the trailer manufacturer's recommendations for the amount of weight on the tongue or hitch according to the total stump grinder package weight), the stump grinder brakes, if equipped, are locked, the cutter wheel is raised off the trailer bed with the lock pin installed, and the stump grinder is securely bound down to the trailer bed per your States binding requirements.
12. Any loose debris, tools or parts must be cleared off or are put away.
13. Make sure to close and secure any of the following if equipped: tool box, battery box, engine cowl doors and side panels, radiator debris screens, inspection doors, cabinet doors, housing covers, tank caps and covers, vise, etc.
14. Make sure the load ramps are securely stored for transport.
15. Make sure the stump grinder's engine is not running, the ignition key is in your possession, and all controls are stored correctly and locked in place for transport.
16. The stump grinder package must be hauled level and the towing vehicle must be sized to handle hitch weight and towing weight. The towing vehicle or the combination of towing vehicle and towing package must have enough braking capacity to meet the Federal and your State Department of Transportation requirements.
17. The stump grinder package is now ready for transport. Make sure to obey all local regulation and laws regarding the transporting of this type of stump grinder.
18. Do not drive too fast for road conditions or exceed speed regulations for equipment towing.

MACHINE ORIENTATION REFERENCE



MAINTENANCE

What to Check	How often to check					Procedure Page #	✓
	Daily (10 hrs.)	Weekly (50 hrs.)	Monthly (200 hrs.)	Quarterly (500 hrs.)	Yearly (2000 hrs.)		
Safety decals	X					20	
Safety equipment	X					20	
Loose bolts, nuts parts or components	X					20	
Safety guards	X					20	
Cutter wheel, pockets, pocket bolts, & teeth	X					20, 24	
Grease cutter wheel bearings	X					20	
Grease jack shaft bearings	X					20	
Clear debris from beltshields	X					20	
Adjust belt tension/ alignement	X					26 - 27	
Hydraulic oil level	X					20	
Fluid leaks	X					20	
Hydraulic control valves	X					20	
Fuel level	X					20	
Engine oil & coolant level	X					20	
Cooling fan & debris screen	X					21	
Air cleaner & precleaner	X					34	
Track Assembly	X					25	
Safety procedures reviewed	X					21	
Grease cylinder lug pins		X				21	
Steel friction areas		X				21	
Set screws in bearings		X				21	
Grease swing spindle assembly			X				
Grinder bearings & sheaves			X			21	
Bearing lock collars			X			21	
Hydraulic function pressure			X			21	
Hydraulic oil filter				X		21	
Inspect swing spindle assembly				X		21	
Dismantle & repack swing spindle assembly				Semi Yearly (1000 hrs.)		21	
Swing out console pivot					X	21	
Fuel tank					X	21	
Hydraulic oil					X	21	
Hydraulic suction screen					X	21	

REMEMBER TO CHECK EVERYTHING ON THE CHECKLIST!

BOLT TORQUE CHART

(THESE TORQUES ARE BASED ON DRY, CLEAN THREADS)

DESCRIPTION	BOLT SIZE	TORQUE (FT.-LBS.)	TORQUE (Nm)
Cutter Wheel Green Teeth Pocket Bolts - Lubricated	5/8" - 18 NF	180	244
Cutter Wheel Green Teeth Pocket Bolts - Dry	5/8" - 18 NF	240	325
Cutter Wheel Green Teeth Nut	7/16" - 14 NC	35	47
Cutter Wheel New River Revolution Tooth Nut	5/8" - 18 NF	150	203
Cutter Wheel Sheave Bushing	1/4" - 20 NC	10	13
Idler Sheave Bushing	1/4" - 20 NC	10	13
Jack Shaft Sheave Bushing - Cutter Wheel Side	1/4" - 20 NC	10	13
Jack Shaft Sheave Bushing - Engine Side	5/16" - 18 NC	15	20
Engine Sheave Bushing Set Screws	3/8" - 16 NC	14	19
Hydraulic Pump Sheave Bushing Set Screws	3/8" - 16 NC	14	19
Cutter Wheel Bearing Bolts	1/2" - 13 NC	98	132
Cutter Wheel Bearing Set Screws		14	19
Track Drive Sprocket	1/2" - 20 Lug Nut	90	122

Before tightening bolts be sure you have the correct size bolt for the correct amount of torque. Use only factory approved teeth and hardware.

DAILY MAINTENANCE

SAFETY DECAL & CONTROL GAUGES

Replace any missing or damaged decals and/or any gauges (if equipped) in the control panel.

SAFETY EQUIPMENT

Check for proper operation. Repair or replace as needed.

LOOSE BOLTS, NUTS, PARTS OR COMPONENTS

Check entire machine for any loose parts or components. Check for loose nuts or bolts. Torque, tighten, or replace any of the loose components. See page 20 for specific bolt torques.

SAFETY GUARDS

Check to make sure all guards are in place and installed correctly. Make sure they are secure.

CUTTER WHEEL, POCKETS, POCKET BOLTS AND TEETH FOR WEAR

Check for elongated bolt holes, secure welds, torqued bolts, excessive wear, and impact cracks. Check the condition of cutter teeth, pockets, and hardware. Rotate cutter teeth to keep them sharp. Replace if necessary. All cutter wheel pockets must be factory approved. Pocket bolts must be replaced after a maximum of 5 rotations/changes to ensure safe clamping ability.

GREASE CUTTER WHEEL BEARINGS

Use an EP-2 Lithium type grease only for all bearings. Purge cutter wheel bearings with grease. You can not over grease these bearings. This type of bearing is designed with a relief system that will not allow over greasing. In other words, you can not hurt the bearing seals by pumping in too much grease. Most of the failures related to bearings are diagnosed as "Contamination". Contamination is caused by improper lubrication. Wipe off excess grease. **Excessive grease will attract dirt.**

GREASE JACK SHAFT BEARINGS

Use an EP-2 Lithium type grease only for all bearings. Purge jack shaft bearings with grease. You can not over grease these bearings. This type of bearing is designed with a relief system that will not allow over greasing. In other words, you can not hurt the bearing seals by pumping in too much grease. Most of the failures related to bearings are diagnosed as "Contamination". Contamination is caused by improper lubrication. Wipe off excess grease. **Excessive grease will attract dirt.**

CLEAN DEBRIS FROM BELTSHIELDS

Inspect the drive side beltshield and the cutter wheel beltshield for debris and clean out any chips.

HYDRAULIC OIL LEVEL

The hydraulic oil reservoir tank level should always remain at 7/8 full. Remember to check DAILY to avoid excessive heat build up.

FLUID LEAKS

Inspect for any oil, fuel, hydraulic oil, or engine coolant leaks. Check all hoses, fittings, lines, and tanks. DO NOT use fingers or skin to check for hydraulic leaks. Repair or replace any damaged or leaking components.

HYDRAULIC CONTROL VALVES

Inspect all hydraulic control valves and ensure they operate smoothly and shift correctly.

FUEL LEVEL

Check the fuel level, running out and repriming is time consuming. Do not over fill, and you must leave fuel expansion space in the top of the tank.

ENGINE OIL & COOLANT LEVEL

Follow the engine manufacturer manual recommendations for fluid levels. You MUST follow specific ENGINE MFG. manual recommendations for radiator coolant, additives, lubrication, correct engine speed, ETC.

DAILY MAINTENANCE

COOLING FAN & DEBRIS SCREEN

Refer to the engine manufacturer's manual. Clean cooling fan, shroud on air cooled engines, and the debris screen (if equipped). Improper service, maintenance, or neglect will cause overheating problems and/or engine failure.

AIR CLEANER & PRECLEANER

Clean or replace element following engine manual recommendations. Also, check and clean the vacuator valve.

REVIEW ALL SAFETY PROCEDURES ON DECALS, FROM MANUAL, & FROM VIDEO

WEEKLY MAINTENANCE

GREASE CYLINDER LUG PIN BUSHING

Grease cylinder lug pin bushings with 1 to 2 shots of EP-2 Lithium type grease. Wipe off excess grease. **Excessive grease will attract dirt.**

ALL STEEL FRICTION AREAS

Lubricate all steel friction areas including , but not limited to pivoting, hinged, sliding, rotating areas on the machine (i.e. cutter wheel guard, control box doors, etc.).

CUTTER WHEEL BEARING LOCK COLLARS

Check set screws in cutter wheel and jack shaft bearings for tightness.

MONTHLY MAINTENANCE

GREASE SWING SPINDLE ASSEMBLY

Grease cylinder lug pin bushings with 2 to 3 shots of EP-2 Lithium type grease. Wipe off excess grease. **Excessive grease will attract dirt.**

GRINDER BEARINGS & SHEAVES

Check and retighten all bearing bolts and belt sheave bushings to correct torque.

JACK SHAFT BEARING LOCK COLLARS

Check and retighten bearing lock collars to correct torque.

HYDRAULIC FUNCTION PRESSURE

Check, reset and maintain all hydraulic function pressure settings to a maximum of the specified PSI (bar). This will give you the best performance from the hydraulic system.

QUARTERLY MAINTENANCE

HYDRAULIC OIL FILTER

Replace hydraulic oil filter after the first 10 hours of operation. Use a 10 Micron filter. After the first change, replace oil filter every 3 months or 400 hours. Located in the hydraulic tank

INSPECT SWING SPINDLE ASSEMBLY

Remove the swing spindle access cover and inspect the grease. If grease is contaminated, dismantle and repack the grease according to the "Dismantle & Repack Swing Spindle Assembly" instructions in the Semi Yearly section.

SEMI YEARLY MAINTENANCE

DISMANTLE & REPACK SWING SPINDLE ASSEMBLY

Remove the swing spindle access cover, inspect and clean the swing spindle bearings, cups, and seals. Replace seals if ever removed. Replace bearings and cups as needed. Grease the bearings with an EP-2 Lithium type grease. Remove rubber plug and pump grease into E-Z Lube zerk until all of the old grease is pumped out of the dust cap. Wipe off excess grease. **Excessive grease will attract dirt.**

YEARLY MAINTENANCE

SWING OUT CONSOLE PIVOT

Grease swing out console pivot once every year 1 to 2 shots with an EP-2 Lithium type grease. Wipe off excess grease. **Excessive grease will attract dirt.**

FUEL TANK

Drain and clean the fuel tank yearly.

HYDRAULIC OIL

Change hydraulic oil and flush the hydraulic reservoir tank.

HYDRAULIC SUCTION SCREEN

Change hydraulic suction screen yearly or every 2000 hours.

PAINT & DECAL CARE

PAINT CARE

To help keep up the appearance of your Bandit equipment and reduce the possibility of surface rust follow these steps:

1. The machine should be washed by hand with water for the first 30 days when the paint is fresh. Afterwards, the **machine should be washed on a regular basis** with an automotive wash soap (not degreaser) and then rinsed thoroughly.
2. **Do not pressure wash sensitive areas** like: decals, gauges, electronic devices, near chips in the paint, etc. If a pressure washer is used after the first 3 months after painting, be aware they are capable of extreme pressures and can damage paint finishes. Also, only use 1500 to 2000 psi with a round pattern nozzle (not a pin point or knife style nozzle) and hold the gun/wand a minimum of 24" (0.6 m) away from the machine.
3. **Always wash the machine immediately upon delivery**, when the machine is new.
4. If shipping or towing the machine in conditions that include road salt/brine, any other ice melt or dust control products, **always wash the machine immediately upon arrival or at the end of the work day.**
5. Park the machine inside or under a roof when not in use.
6. Do not allow fuel, antifreeze, DEF fluid, or any other motor fluid to set on the machine. Remove immediately.
7. If a stone chip, paint scratch, or paint crack occurs - it should be repaired immediately. Simply sand the edges of the damaged paint area, mask off the surrounding area, and apply primer and paint to the dry, clean, and warm area. This will keep the damaged area from spreading or getting worse.
8. If you are unable to sand and mask the area, there are containers of primer and paint available. A small brush can be used to touch up the area after it is cleaned, dry, and warmed. Also, primer and most colors of paint are available in aerosol spray cans.
9. Keep good mud flaps on towing trucks to reduce stone chips.
10. Use an automotive wax on a regular basis after the first 3 months after painting.

DECAL CARE

Decals located on your Bandit equipment contain useful information to assist you in operating your equipment safely. The safety decals are shown and explained in this section along with decal locations.

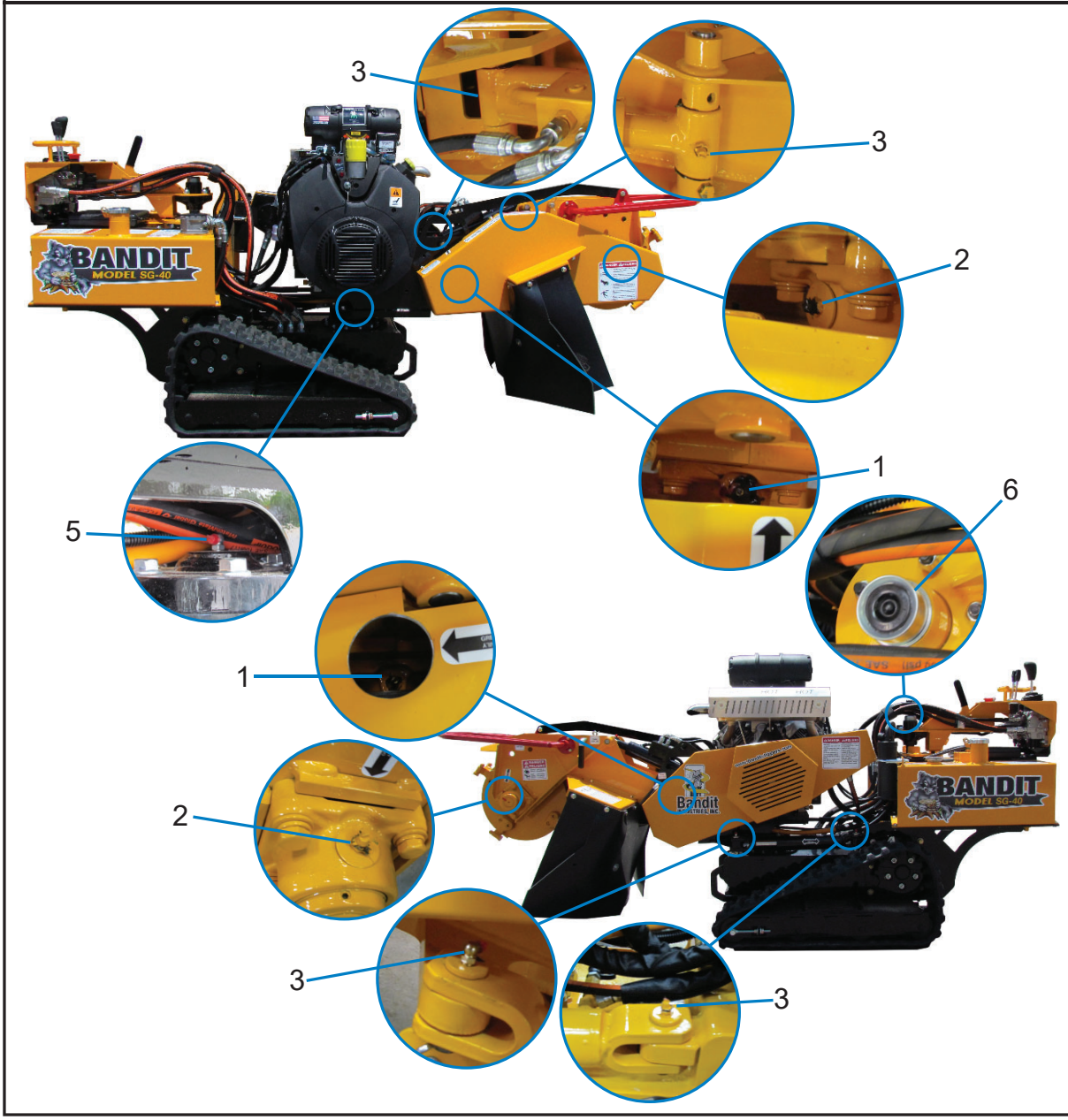
It is very important that all decals remain in place and in good condition on your machine. Please follow the care and instructions given below.

1. You should use soap and water to keep your decals clean. Never use mineral spirits or any other abrasive cleaners.
2. Immediately replace any missing or damaged decals. The location the decal is going to be applied to must be clean and dry, and at least 40°F (5°C) before applying decal.
3. When the need arises to replace a machine component with a decal attached, be sure and replace the decal.
4. Replacement decals are available, and can be purchased from the manufacturer or your Bandit Dealer.
5. Peel back about half of the backer paper on the decal. Position it on the flat, dry, clean surface so it is smooth and secure. Peel off the remainder of the backer paper as you continue to stick the decal on the surface.
6. Rub decal from the center outward to remove air bubbles and to secure contact.
7. English/Spanish decals are typically standard. Other foreign language decals are available and may be purchased. Mail translated decals required to Bandit Industries, Inc.

LUBRICATION CHART

		CHECK			
#	DESCRIPTION	DAY	WEEK	MONTH	PROCEDURE
1	Jack Shaft Bearings	X			Purge bearings daily - wipe off excess
2	Cutter Wheel Bearings	X			Purge bearings daily - wipe off excess
3	Cylinder Lug Pin Bushings		X		1 - 2 shots of grease - wipe off excess
4	Steel Friction Areas: pivoting, hinged, sliding, rolling		X		Lubricate (i.e. cutter wheel guard, control box doors, etc.)
5	Swing Spindle Assembly			X	2 - 3 shots of grease - wipe off excess
6	Swing Out Console Pivot			Yearly	1 - 2 shots of grease - wipe off excess

A right angle grease fitting may need to be used to grease some of the lubrication points. This type of grease fitting can be obtained from most local automotive parts stores.



NOTICE Use as a reference only, locations may vary depending on options or component manufacturer. Lubrication point instructions are described on the machine, in the Lubrication & Coolant Section and Maintenance Section of this manual, or component manufacturer's manual.

CUTTER WHEEL

SAFETY INSTRUCTIONS

Before attempting any type of maintenance, disengage clutch or cutter wheel engagement, wait for the cutter wheel to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, disconnect the battery, and install the cutter wheel lock pin.

⚠ DANGER

DO NOT go near the rotating cutter head for any reason. DO NOT go near the cutter head while the engine is running or the cutter head is coasting to a stop. Contact with a rotating cutter head will result in serious bodily injury or death.

Never use hand on cutter wheel to hold in place while changing teeth. Be sure to remove locking pin before operating the machine.

NOTICE

DO NOT operate machine with extremely worn or broken teeth.

DO NOT operate machine without a full set of teeth. Operating the machine without a full set of teeth can cause excessive vibration and premature bearing failure.

Use only original equipment manufacturer's teeth. The use of any other aftermarket teeth may cause damage or premature failure to the drive train.

A locking pin is provided to hold the cutter wheel in position during tooth removal and reinstallation. Locking pin will only lock on outer teeth.

GREEN TEETH MAINTENANCE

See Page 40 for Cutter Wheel Setup & Part Numbers

Inspect pockets, teeth and bolts for damage and replace as required.

When replacing pockets, always replace new pockets across from each other (180°) in order to prevent vibration.

Replacement teeth must be carbide tipped and of like design as provided with the machine.

Use anti-seize on threads to help prevent bolts from "freezing up" in cutter wheel pockets.

When replacing complete set of teeth, be sure to duplicate original factory tooth arrangement, with the carbide tip facing the cutter wheel rotation. Typically a 1/2" socket is required to change or torque the teeth. See page 20 for torque specifications.

When the tooth has 1/16" of wear on the carbide tip, it is time to rotate or replace the tooth.

NEW RIVER "REVOLUTION" MAINTENANCE

See Page 41 for Cutter Wheel Setup & Part Numbers

Inspect pockets, teeth and bolts for damage and replace as required.

When replacing pockets, always replace new pockets across from each other (180°) in order to prevent vibration.

Replacement teeth must be carbide tipped and of like design as provided with the machine.

To make sure the correct tooth pattern is used, make sure a pocket with a locator pin is used on a station with a locator pin hole. Use the pockets without the locator pin on a station without the locator pin hole.

When replacing complete set of teeth, be sure to duplicate original factory tooth arrangement, with the carbide tip facing the cutter wheel rotation. Typically a 15/16" socket is required to change or torque the teeth. See page 20 for torque specifications.

TRACK TENSION

SAFETY INSTRUCTIONS

Before attempting any type of maintenance, disengage clutch or cutter wheel engagement, wait for the cutter wheel to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, disconnect the battery, and install the cutter wheel lock pin.

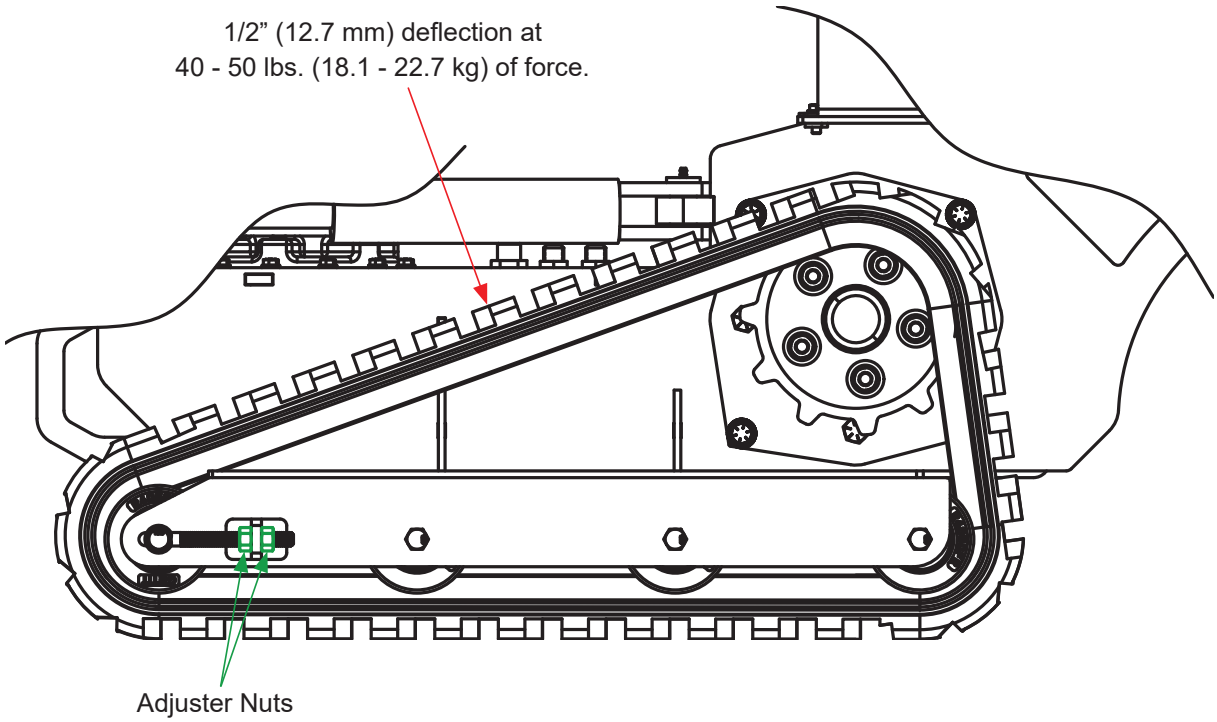
⚠ DANGER

Avoid moving parts. Keep hands, feet, and clothing away from power driven parts. Keep all guards and shields in place and properly secured.

Keep hands clear of pinch points.

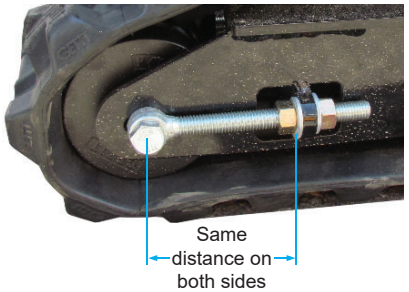
1. Measure the deflection with 40 - 50 lbs. (18.1 - 22.7 kg) of force with 1/2" deflection.
2. If the deflection is not 1/2" tighten or loosen the nuts on the adjuster bolt (shown in green in Figure 1). Note: you will need to adjust the adjuster bolt on the opposite side of the track.
3. Check the tension again and adjust as needed.

Figure 1



NOTICE

Make sure the distance on the track roller adjuster bolt is the same on both sides of each track.



BELT TENSION

SAFETY INSTRUCTIONS

Before attempting any type of maintenance, disengage clutch or cutter wheel engagement, wait for the cutter wheel to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, disconnect the battery, and install the cutter wheel lock pin.

⚠ DANGER

Keep hands clear of pinch points.

NOTICE

Do not over tighten the hydraulic pump belt. For best results use a good belt tension tester. Most all pump failures result from too much side load on the pump shaft. Too much belt tension is very easy to detect inside a failed pump. Pumps with this condition will not be covered under warranty.

DO NOT IGNORE THIS MAINTENANCE RULE

New belts stretch very soon and must be adjusted several times in the first few hours of operation. Adjust after one hour of operation, then every four hours until the belts quit stretching.

GENERAL RULES FOR TENSIONING

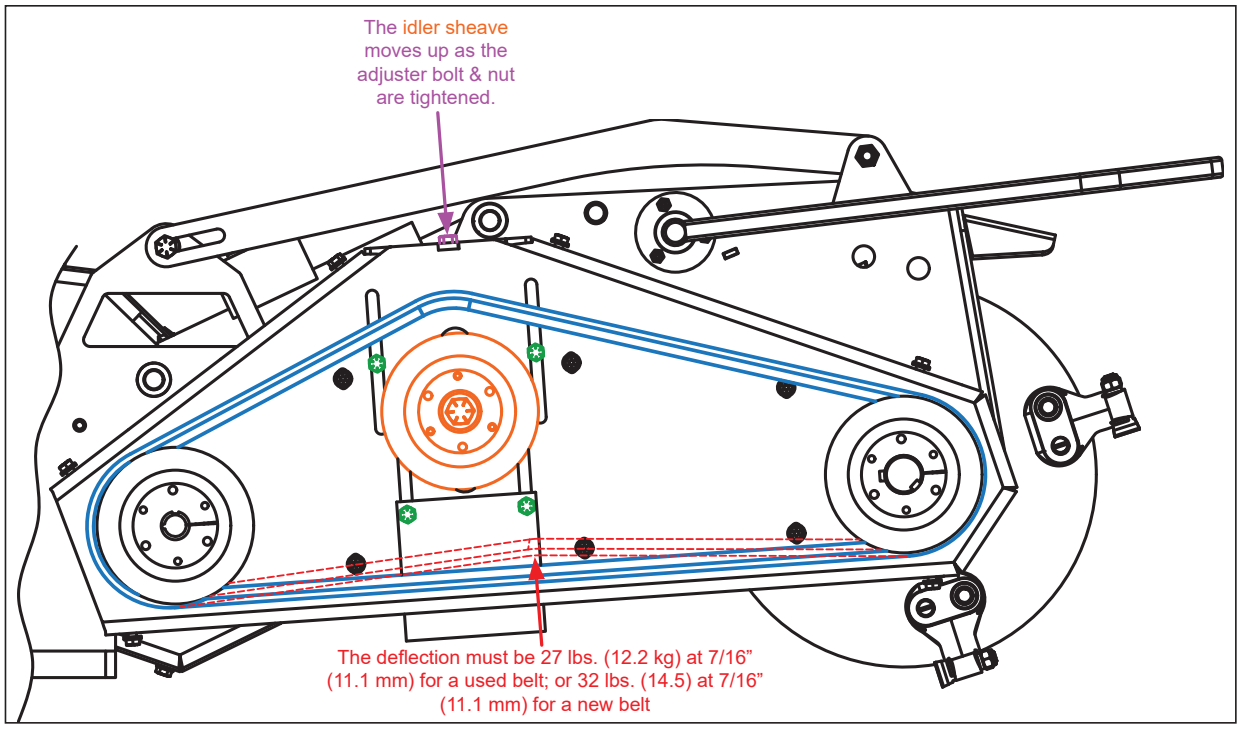
1. Check tensioning during the first 2 through 48 hours of run-in operation especially.
2. Over tensioning or under tensioning shortens belt and bearing life.
3. Keep belts free from foreign materials that may cause the belt to slip.
4. Make V-drive inspection on a periodic basis. Never use belt dressing as this will damage the belt and cause early failure.
5. Belts should never be forced over the sheave. Allow enough room for belts to slip on.
6. Always make sure sheaves are aligned properly.

CUTTER WHEEL BELT

1. Follow all pre maintenance shut down procedures.
2. Remove the cutter wheel side beltshield.
3. Locate the center of the belt span between the jack shaft sheave and the cutter wheel sheave.
4. Push up on the bottom side of the cutter wheel belt (highlighted in blue in Figure 1) with a double barrel belt tension gauge until the belt has deflected 7/16” (11.1 mm).
5. Record the push force. The force should be 27 lbs. (12.2 kg) for a used belt or 32 lbs. (14.5 kg) for a new belt.
6. Adjust the belt tension if the force falls out of this range.

CUTTER WHEEL BELT ADJUSTMENT

1. Follow all pre maintenance shut down procedures.
2. Remove the cutter wheel side beltshield.
3. Loosen the tensioner bolts (shown in green in Figure 1).
4. Loosen or tighten the adjuster bolt (highlighted purple in Figure 1) to achieve the correct tension.
5. Tighten the tensioner bolts (shown in green in Figure 1).
6. Once the correct tension is achieved, reinstall the cutter wheel beltshield.



BELT TENSION

ENGINE BELT

1. Follow all pre maintenance shut down procedures.
2. Remove the engine side beltshield.
3. Locate the center of the belt span between the jack shaft sheave and the engine sheave.
4. Push up on the bottom side of the engine belt with a double barrel belt tension gauge until the belt has deflected 1/4” (6.4 mm).
5. Record the push force. The force should be 16 lbs. (7.3 kg) for a used belt or 17.5 lbs. (7.9 kg) for a new belt.
6. Adjust the belt tension if the force falls out of this range.

ENGINE BELT ADJUSTMENT

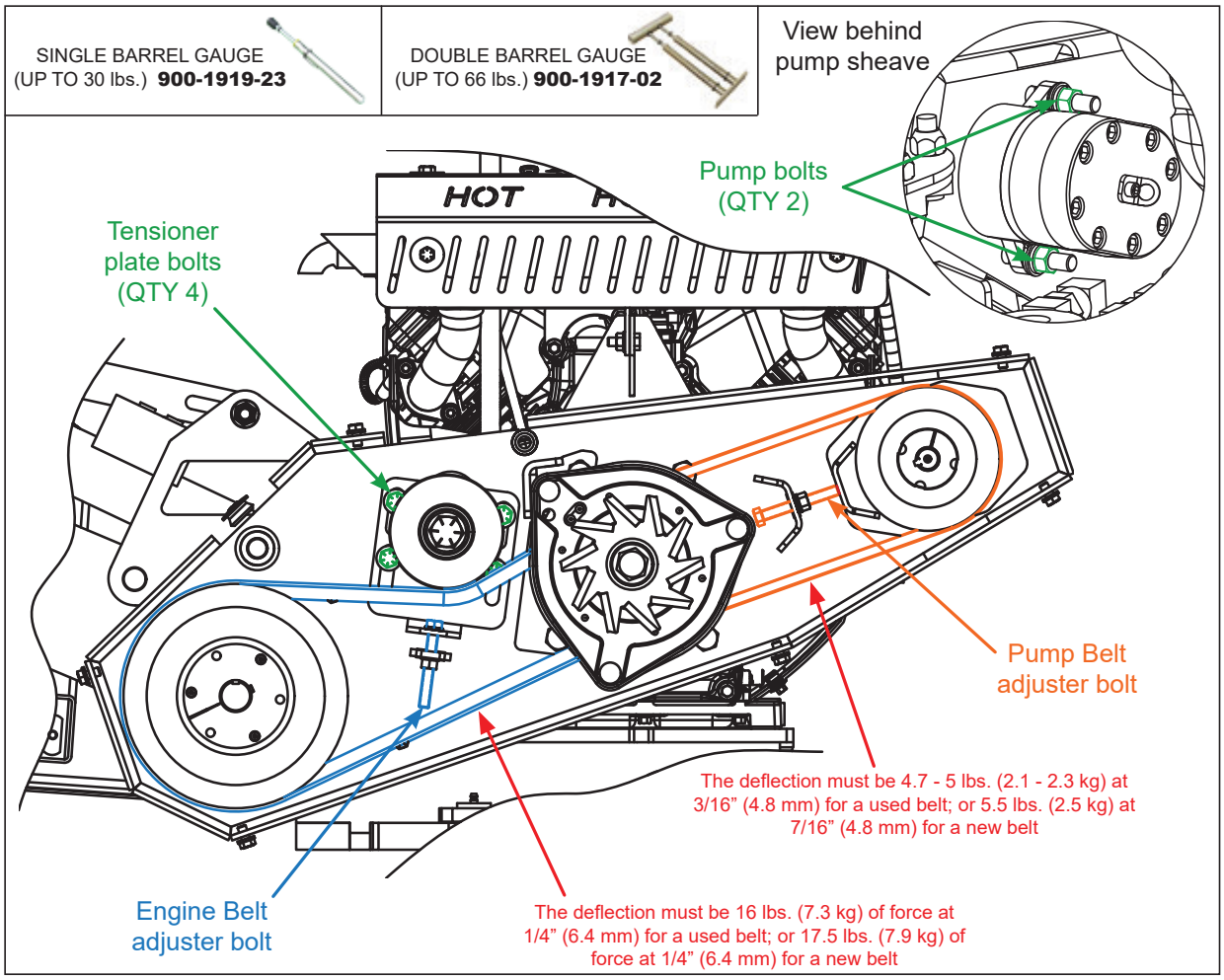
1. Follow all pre maintenance shut down procedures.
2. Remove the engine side beltshield.
3. Loosen all four tensioner plate bolts (shown in green in Figure 1).
4. Loosen or tighten the adjuster bolt (shown in blue in Figure 1) to achieve the correct tension.
5. Tighten all four tensioner plate bolts (shown in green in Figure 1).
6. Once the correct tension is achieved, reinstall the engine beltshield.

PUMP DRIVE BELT

1. Locate the center of the span between sheaves.
2. Push or pull down on the belt until the belt has deflected 3/16” (4.8 mm).
3. Record push or pull down force. The force should be 4.7 - 5 lbs (2.1 - 2.3 kg) for a used belt or 5.5 lbs (2.5 kg) for a new belt.
4. Adjust the belt tension if the force falls outside of this range.
5. If adjustment is needed, loosen both pump mount bolts.
6. Adjust the pump to achieve the required force and deflection
7. Tighten the pump mount bolts.

PUMP BELT ADJUSTMENT

1. Follow all pre maintenance shut down procedures.
2. Remove the engine side beltshield.
3. Loosen the pump bolts (shown in green in Figure 1).
4. Loosen or tighten the pump adjuster bolt (shown in orange in Figure 1) to achieve the correct tension.
5. Tighten the pump bolts (highlighted green in Figure 1).
6. Once the correct tension is achieved, reinstall the engine beltshield.



TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
Engine will not start (See engine manufacturer's manual for more information)	Loose ground cable.	Clean and tighten.
	Loose hot cable.	Clean and tighten.
	Dead battery.	Recharge or replace.
	Cutter wheel was engaged before the machine was started.	Make sure the ignition switch is off, disengage cutter wheel and restart the machine.
	Emergency stop activated.	Pull or twist the emergency stop to deactivate.
Cutter wheel vibration.	Tooth missing.	Replace missing teeth.
	Pocket out of balance. **Do not mix new & worn out teeth.**	Always replace pockets in pairs across from each other.
	Improper tooth arrangement. **Do not mix new & worn out teeth.**	Install correctly with like pairs of teeth directly across from each other.
Cutter wheel throwing teeth.	Bad pocket.	Replace pocket.
	Dirt in pocket.	Clean pocket and replace teeth. **Always replace pockets in pairs across from each other.**
Breaking teeth.	Operator hitting rocks.	Avoid rocks, stones, etc.
Cutter wheel stops turning.	Cutter wheel belt loose or broke.	Adjust or replace.
	Debris wedged around cutter wheel.	Clean out debris.
Belt squeal.	Belt tension too loose.	Tighten or replace.
	Belt out of alignment.	Align sheaves.
Belt jumping off.	Engaging or disengaging belt at high engine RPM.	Engage/disengage belts at low engine speed or replace.
	Belt tensioners are too loose.	Adjust belt tension. Refer to belt tension of the maintenance section.
	Sheaves out of alignment.	Make sure sheaves are aligned properly.
Roar in machine when cutter wheel is engaged.	Belt guards rubbing on cutter wheel shaft.	Reposition guards off of shafts.
	Cutter wheel bearings going bad.	Replace bearings.
Bearing will not take grease.	Grease fitting clogged.	Replace.

HYDRAULICS

SAFETY INSTRUCTIONS

Before attempting any type of maintenance, disengage clutch, wait for the drum to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, install the drum lock pin, and disconnect the battery.

⚠ WARNING

Do not go near hydraulic leaks. High pressure oil easily punctures skin causing serious injury, gangrene, or death. Avoid burns from fluid. Hot fluid under pressure can cause severe burns. Do not use fingers or skin to check for leaks. Lower load or relieve hydraulic pressure before loosening fittings. Relieve all pressure in the system before disconnecting the lines, hoses, or performing other work. Use a piece of cardboard to find leaks. Never use your bare hands. Allow system to cool down to ambient temperature before opening any coolant or hydraulic oil system.

It is very important after you have operated a new machine for approximately an hour to shut down the machine and recheck all hydraulic fittings. Relieve all pressure and retighten as needed.

In cold weather situations let your hydraulic system idle for approximately 15 minutes to allow the system to warm up to operating temperature.

⚠ WARNING

Do not operate this machine unless all hydraulic control devices operate properly. They must function, shift and position smoothly and accurately at all times. Faulty controls can cause personal injury.

NOTICE

Some equipment and components including fluid engagement clutches (PTO's) have their own lubrication requirements. Consult their manufacturer's manual for that information.

After the initial start-up of the machine and after any replacement of hydraulic components, fittings and hoses must be re-checked for leaks and clearances.

When returning hydraulic components for warranty make sure to box up all warranted parts to avoid additional damage while shipping. Do not disassemble any hydraulic components which are to be warrantied. Anything which has been disassembled or tampered with will not be warrantied. Items being returned must be clean. All hydraulic components must have all hosing ports plugged. Failure to plug ports will allow debris to enter components which will void warranty.

This machine is equipped with a very efficient, simple hydraulic system. Each component is capable of withstanding a specified pressure and still operate for a very long time.

If the simple rules mentioned below are followed, the hydraulic components will last for years:

- Avoid hydraulic pump cavitation. Low oil levels or cold start-ups will cause the hydraulic pump to cavitate. Cavitation will ruin the pump and possibly the entire hydraulic system. Cavitation only has to happen once. This will start the pump on its way to ruin. Allow hydraulic system to turn slowly for several minutes in cold weather in order for hydraulic system to warm up. Cavitation is not covered under warranty.
- Keep hydraulic oil clean. Dirty oil will cause excessive wear and loss of hydraulic power.
- Replace the hydraulic oil filter(s) after first 10 hours and with each 400 hours of operation or 3 months.
- Replace hydraulic oil & suction screen(s) at least once yearly. This is also a very good time to flush and clean the tank. Replace hydraulic oil immediately if it is contaminated or looks "milky". See "Hydraulic Oil Requirements".
- If the machine's hydraulic system is kept clean and the hydraulic pressures are not increased beyond the specified pressure, the maximum use and life should be received from the hydraulic system.
- If a problem is encountered, it will more than likely be located in the relief valve or something as simple as belts or clutch slipping, check these first.
- Only use the optional adjustable flow control when chipping large diameter trees. Do not leave the speed adjustment partially open for long periods of time. This will cause excessive heat to the hydraulic system! Excessive heat will cause low feedwheel power and premature failure of all hydraulic components. Always operate system at full oil flow unless chipping large diameter trees.
- Do not close the optional hydraulic shut-off valve for more than 3 to 4 seconds. Hydraulic shut-off valve handle must be completely turned on (in line with hose) at all times unless checking hydraulic pressure. Pressure gauge should be safely stored and installed only when checking pressure. Follow above instructions or this will cause unwarranted damage to the hydraulic components.
- Never close the ball valves on the hydraulic tank suction ports (if equipped) while the machine is running, this will ruin the hydraulic pump and components.

HYDRAULIC FLUID REQUIREMENTS

This machine is equipped with “Petro-Canada Hydrex XV” hydraulic fluid and it is recommended to be replaced with the same. “Petro-Canada Hydrex XV” is an all season hydraulic fluid. This is a premium performance, long life anti-wear, hydraulic fluid, designed for all season use in heavy duty hydraulic systems. “Petro-Canada Hydrex XV” allows year round use under wide extremes of temperature. It allows the hydraulic system to start at temperatures as low as -40°C/-40°F, under no load conditions and it improves lubrication of hydraulic components at high operating temperatures. It will also help protect against hydraulic failures during the wide temperature swings of spring and fall.

Multi Viscosity motor oils are not recommended to mix with “Petro-Canada Hydrex XV” hydraulic oil. AW oils may mix with “Petro-Canada Hydrex XV” hydraulic oil. The following are specifications and authorizations of compatible oils. Only a high quality anti-wear (AW) hydraulic oil containing foam, corrosion, rust and oxidation inhibitors should be used. This viscosity grade depends on the oil temperature in service, based on the climate and operating conditions.

Alternative hydraulic oils are available, but they do not equal the performance or longevity of the “Hydrex XV” oil. Consult the following information supplied by the oil distributor.

	Hydrex XV	ISO 22, AW	ISO 32, AW	ISO 46, AW	ISO 68, AW	ISO 100, AW
Viscosity Index	245	110	110	104	106	102
Cold Start-up °C (°F)	-40 (-40)	-37 (-29)	-31 (-14)	-26 (-3)	-22 (16)	-16 (24)

CELSIUS (°C)	-40	-20	-18	-13	-5	0	1	7	15	25	35	45	55	65	75	85	95
FAHRENHEIT (°F)	-40	4	0	9	23	32	34	45	59	77	95	113	131	149	167	185	203

NOTICE

The above chart is a suggested guide for viscosity of hydraulic fluids at start up ambient temperature. The load, demand, and cleanliness of the equipment will affect actual oil temperatures which can increase dramatically above ambient air temperatures during operation. The actual viscosity needed is based on oil temperature during operation and not air temperature. Compare your fluid specifications with the specifications below to verify compliance.

Hydraulic fluids vary in their resistance to oxidation at elevated temperatures, their ability to protect against metal-to-metal contact under increasing temperature, and their ability to separate water from the fluid. Viscosity is temperature dependent. Fluids with high viscosity-index (VI) will thin out slower at higher temperature and thicken slower at colder temperatures allowing a wider operating range. Choose a fluid that has test results in these areas for best results.

Based on the varying temperatures of the area where Bandit equipment is used, and the high demand and loads placed on this equipment, Bandit has filled each hydraulic system with Petro-Canada’s Hydrex XV All Season Hydraulic Fluid for maximum protection and performance.

When choosing a hydraulic fluid - these maximum and minimum specifications must be met:

Minimum Viscosity during operation = 12 cSt
Maximum No-Load Viscosity at start-up = 2000 cSt

Go to: lubricants.petro-canada.com and click on “Contact Us” then click “Request A Quote” to find your nearest Petro-Canada dealer.

HYDRAULICS

TYPICAL HYDRAULIC RELIEF PRESSURE SETTINGS (Approximate, For Reference Only, Engine At Full RPM)

NOTICE

Do not under any circumstances over-set these relief pressures, it will cause damage to component parts and hydraulic parts.

These typical hydraulic flows and relief pressure settings are with the engine at full RPM. All settings are subject to change.

After the initial start-up of the machine and after any replacement of hydraulic components, fittings and hoses must be re-checked for leaks and clearances.

Equipment Model	SG-40
Track Drive PSI (bar)	2950 (203)
Swing Setting - Right PSI (bar)	1000 (68)
Swing Setting - Left PSI (bar)	1200 (82)
Cutter Wheel Up / Down PSI (bar)	1800 (124)

CHECKING HYDRAULIC PRESSURE

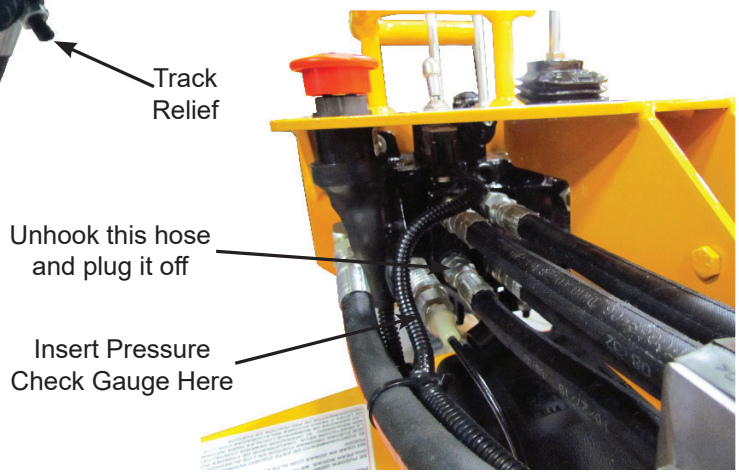
The relief valve is typically located internally in the valve bank. Do not adjust the relief valves above the specified psi (bar). The relief valve system is a simple spring tension design but small pieces of debris can stick the valve partially open which weakens the hydraulic power. The relief as well as hydraulic oil, and suction screen must be kept clean.

SWING LEFT/RIGHT & CUTTER WHEEL UP/DOWN PROCEDURE

1. Make sure all the controls are in the off position.
2. Install pressure gauge into the test port, see below.
3. Start engine and adjust engine to full throttle.
4. Engage the control lever or switch so that the cylinder of the function that needs to be checked, bottoms out and then read the pressure gauge.
5. Adjust relief if necessary. Turn the relief clockwise to increase pressure and counter-clockwise to decrease the pressure.

RIGHT & LEFT TRACK PROCEDURE

1. Make sure all the controls are in the off position.
2. Swing the console to the right side, and place a drip pan below.
3. Unhook the Right Track B-Port hose and plug it off.
4. Install pressure gauge into the test port, see below.
5. Start engine and adjust engine to full throttle.
6. Engage the Right Track in the forward position and read the pressure gauge.
7. Adjust relief if necessary. Turn the relief clockwise to increase pressure and counter-clockwise to decrease the pressure.



HYDRAULIC SYSTEM TROUBLE SHOOTING

SAFETY INSTRUCTIONS

Before attempting any type of maintenance, disengage clutch or cutter wheel engagement, wait for the cutter wheel to come to a complete stop, turn off engine, remove the ignition key, make sure the ignition key is in your possession, disconnect the battery, and install the cutter wheel lock pin.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Hydraulic oil very hot, causing system to operate slowly.	Low oil level.	Fill 7/8 full minimum.
	Worn pump.	Replace.
	Poor oil quality.	Replace.
	Damaged hose.	Replace.
	Oil suction screen or filter plugged	Replace.
	Binding	Binding
Hydraulic system loss of power.	Low oil level.	Fill 7/8 full minimum.
	Poor oil quality.	Replace.
	Bad cylinder.	Repair or replace.
	Bad pump.	Replace.
	Relief stuck open.	Clean or replace.
Swing cylinder loss of power.	Bad cylinder.	Repair or replace.
	Bad pump.	Replace.
	Relief stuck open.	Clean or replace.
Cutter wheel does not stay in up position, creeps down.	Bad cylinder	Repair or replace.

NOTICE

In cold weather situations, let the hydraulic system idle for approximately 15 minutes to allow the system to warm up to operating temperature. Running cold oil through the hydrostatic motor can raise the case drain pressures and damage the shaft seals.

When returning hydraulic components for warranty make sure to box up all warranted parts to avoid additional damage while shipping. **Do not disassemble any hydraulic components which are to be warranted.** Anything which has been disassembled or tampered with will not be warranted. Items being returned must be clean. All hydraulic components must have all hosing ports plugged. Failure to plug ports will allow debris to enter components which will void warranty.

REPLACEMENT PARTS

Depending on what replacement parts you are ordering the following information will be needed:

GRINDER COMPONENTS

Serial Number
Model Number of Grinder

ENGINE COMPONENTS

Brand
Engine Serial Number
Engine Spec. Number

NOTICE

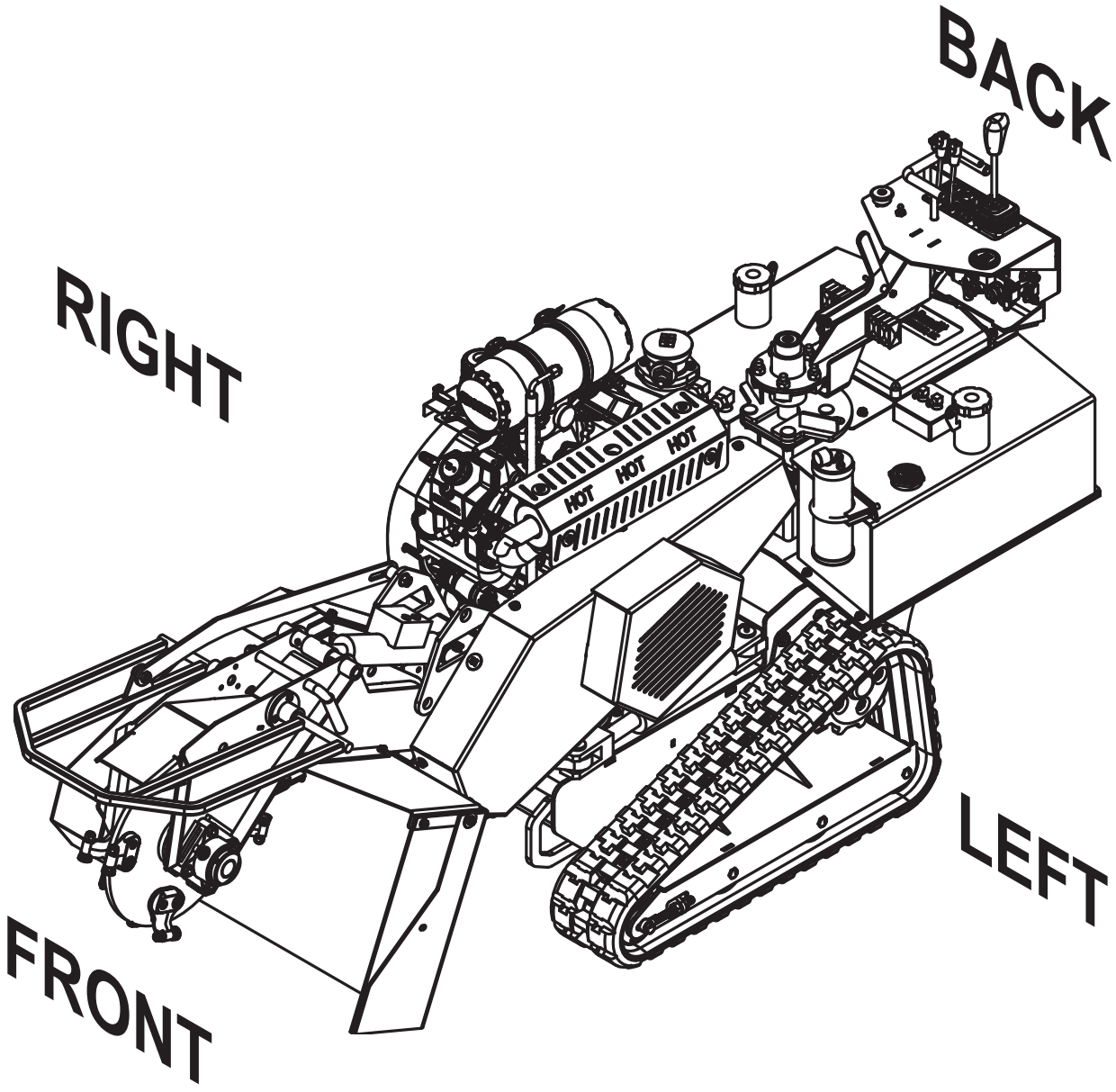
All parts in this section may not be exactly as shown.

All nuts, bolts, washers, and many other components can be ordered by physical description.

Some of the components shown in this section are for optional equipment and may not apply to every machine.

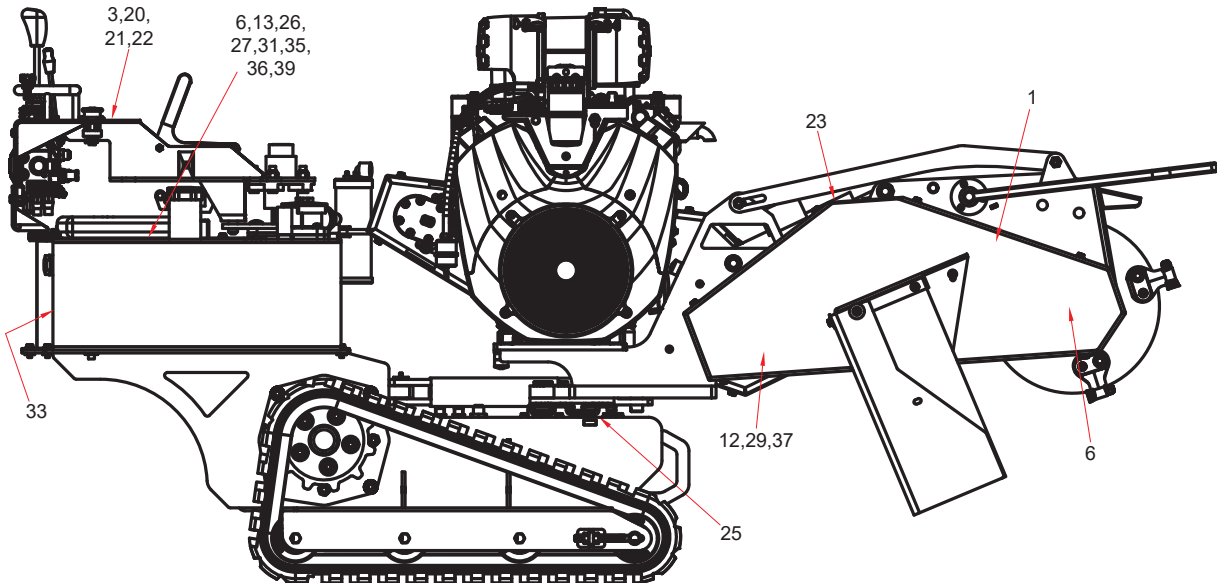
Bandit Industries Inc. reserves the right to make changes in models, size, design, installations and applications on any part without notification.

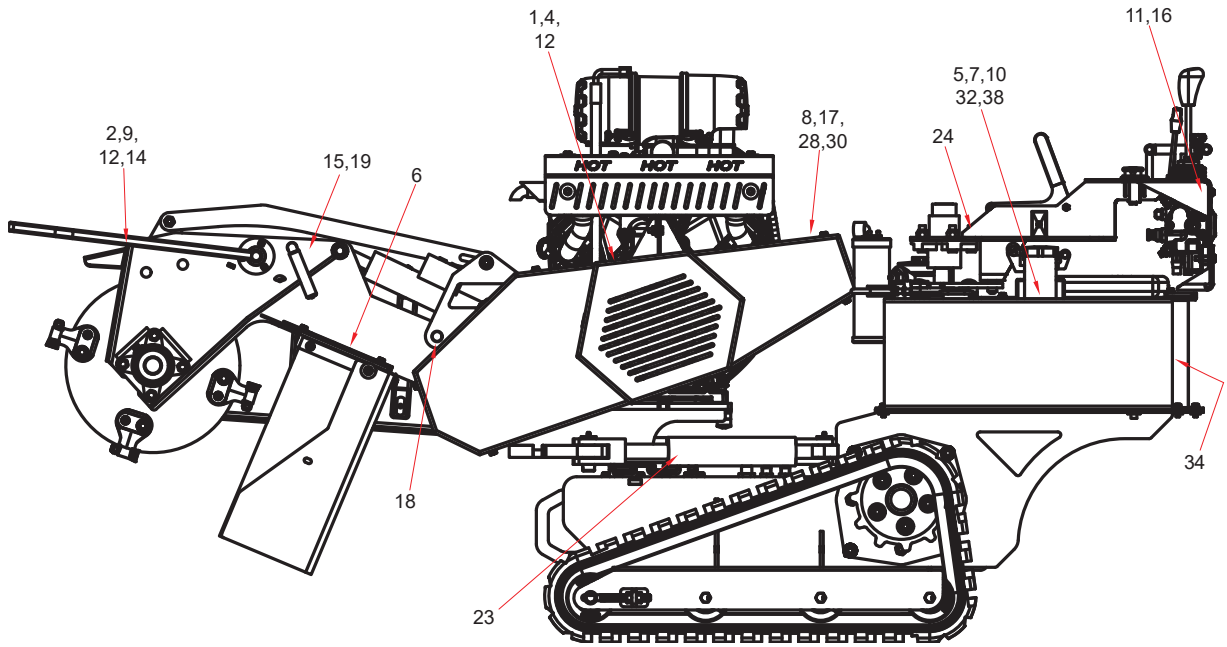
MACHINE ORIENTATION REFERENCE



DECALS

Decal locations may vary, these are general locations.





DECALS

#	Decal	Description
1	SPD-02	Moving Parts...
2	SPD-20	Flying Objects Stand Clear...
3	SPD-22	Emergency Shut Down Only
4	SPD-28	Do Not Insert Fingers...
5	SPD-30	Do Not Sit, Stand, Lay, Climb...
6	SPD-36	...Debris Field...
7	SPD-38	Do Not Entangle Feet...
8	SPD-39	Do Not Operate...
9	SPD-63	Do Not Go Near Cutter Wheel...
10	SPD-69	Do Not Start to Grind...
11	ID-67	Bandit Industries Inc...USA
12	INST-12	Grease Daily
13	INST-53	Hydraulic Oil...Hydrex XV
14	INST-73	Cutterhead Lock Hole
15	INST-74	Cutterhead Lock Pin
16	INST-81	Swing Speed Controls
17	INST-101	Canada Engine Decal
18	INST-111	Frame Lock Hole
19	INST-112	Frame Lock Pin
20	INST-180	Cutter Wheel On/Off
21	INST-365	Joystick Functions
22	INST-366	Swing Out Console Lock
23	INST-393	Grease Weekly - Double Arrow
24	INST-395	Grease Yearly
25	INST-446	Grease Monthly 2-3 Pumps
26	N-02	Maintain Lubrication...
27	SPN-06	Decal Maintenance...
28	N-33	Engine Oil Lubrication... Break-In
29	N-71	Patents...
30	N-72	Service Required Under Beltshield
31	SPW-01	Do Not Go Near Oil Leaks...
32	SPW-03	Gasoline Fuel Only
33	SPW-04	Frozen Battery Can Explode
34	SPW-08	Wear Personal Protection...
35	SPW-28	...Fire Hazard...
36	SPW-43	Do Not Attempt...Slope More Than...
37	SPW-47	Proposition 65...
38	OL-274	Gasoline Only
39	OL-313	Hydraulic Fluid Only
40	**900-8918-09**	**Bandit Model SG-40 Logo & Safety Decal Kit - English/Spanish**
41	**900-8918-34**	**Bandit Model SG-40 Logo & Decal Kit - English Only**

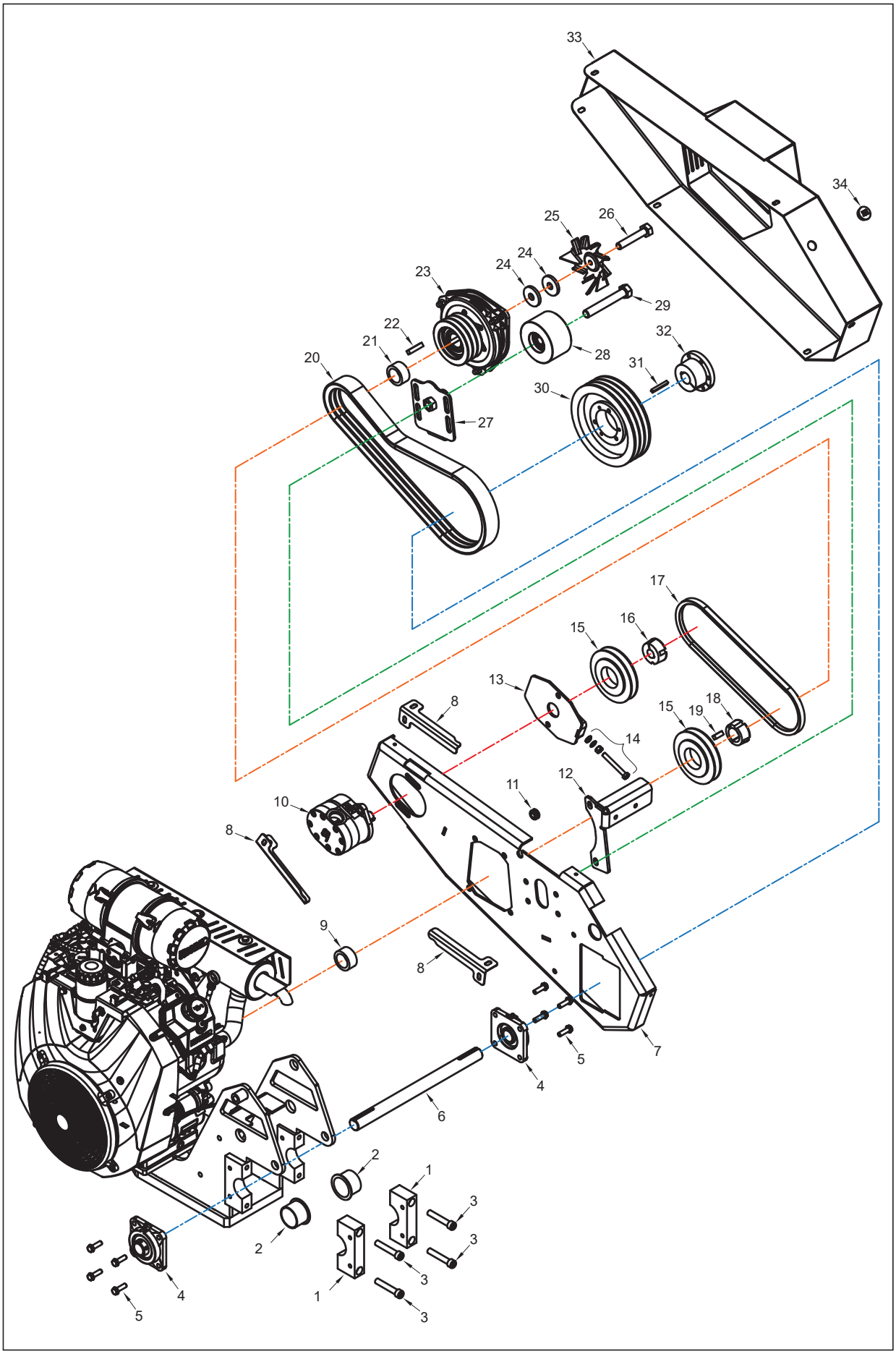
NOTICE

Modifications and/or additions of decals to this list will happen. Consult dealer or manufacturer for most current decal package.

NOTICE

Some decals are for optional equipment. Decal locations may vary, these are general locations. If any decals become damaged, replace immediately.

ENGINE SIDE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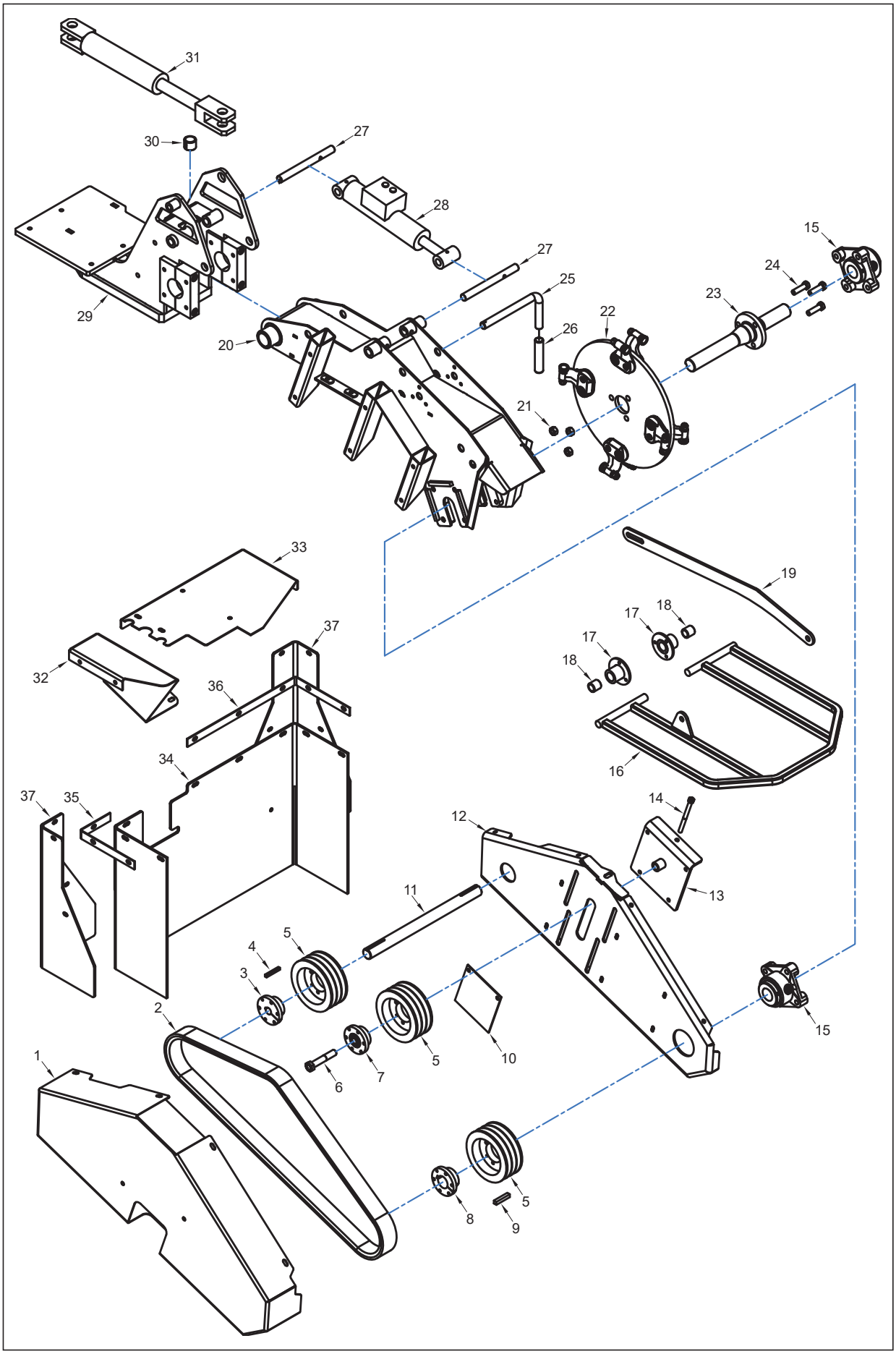
ENGINE SIDE

#	Part Number	Description
1	208-3000-90	Pivot Bearing Cap
2	900-1923-27	Flange Bushing
3	900-4916-70	Pivot Bearing Cap Bolt - 1/2”-13NC x 2 3/4” SHCS
4	900-1923-25	Jack Shaft Bearing
5	900-4913-92	Jack Shaft Bearing Bolt - 3/8”-16NC x 1 1/4” Serrated Flange Bolt
6	208-3000-43	Jack Shaft
7	208-2000-53	Beltshield Backer
8	918-3045-09	Slot Cover
9	208-3002-73	
10	900-3982-38	Hydraulic Pump
11	900-7900-10	Rubber Grommet
12	208-2000-59	Clutch Pin Arm
13	208-2000-58	Hydraulic Pump Adjuster
14	900-4910-64	Hydraulic Pump Adjuster Bolt - 3/8”-16NC x 3” Hex Head Bolt
	900-4906-60	3/8”-16NC Lock Nut
	900-4905-88	Nord Lock Washer
	900-4910-97	5/16” Mill Carb Washer
15	900-1924-78	Pump & Engine Sheave
16	900-1924-62	Pump Sheave Bushing

#	Part Number	Description
17	900-1924-79	Engine to Hydraulic Drive Belt
18	900-1924-50	Engine Sheave Bushing
19	001-3007-05	Key for Engine Sheave
20	900-1924-55	Engine to Jack Shaft Drive Belt
21	208-3002-72	Clutch Spacer with clutch 900-6019-70 (Between Clutch & Engine Sheave)
	208-3001-10	Clutch Spacer with clutch 900-6912-24 (Between Clutch & Engine Sheave)
22	001-3007-04	Key for Clutch
23	900-6019-70	Ogura Clutch - Version 2
	900-6912-24	Ogura Clutch - Version 1
24	208-3000-89	Clutch Fan Spacer (qty 2 with clutch 900-6019-70 and qty 1 with clutch 900-6912-24)
25	900-6970-04	Clutch Fan
26	900-4917-99	Clutch Fan Bolt - 5/8”-18NF x 3 1/2”
27	208-2000-56	Clutch Belt Tensioner Plate
28	208-1000-36	Clutch Drive Idler
29	900-4910-41	Clutch Drive Idler Bolt
30	900-1924-54	Jack Shaft Sheave
31	200-300087	Key for Jack Shaft Sheave
32	900-1924-31	Jack Shaft Sheave Bushing
33	208-2000-54	Beltshield Cover
34	904-0009-82	Grease Zerk Access Cover

CUTTER WHEEL SIDE

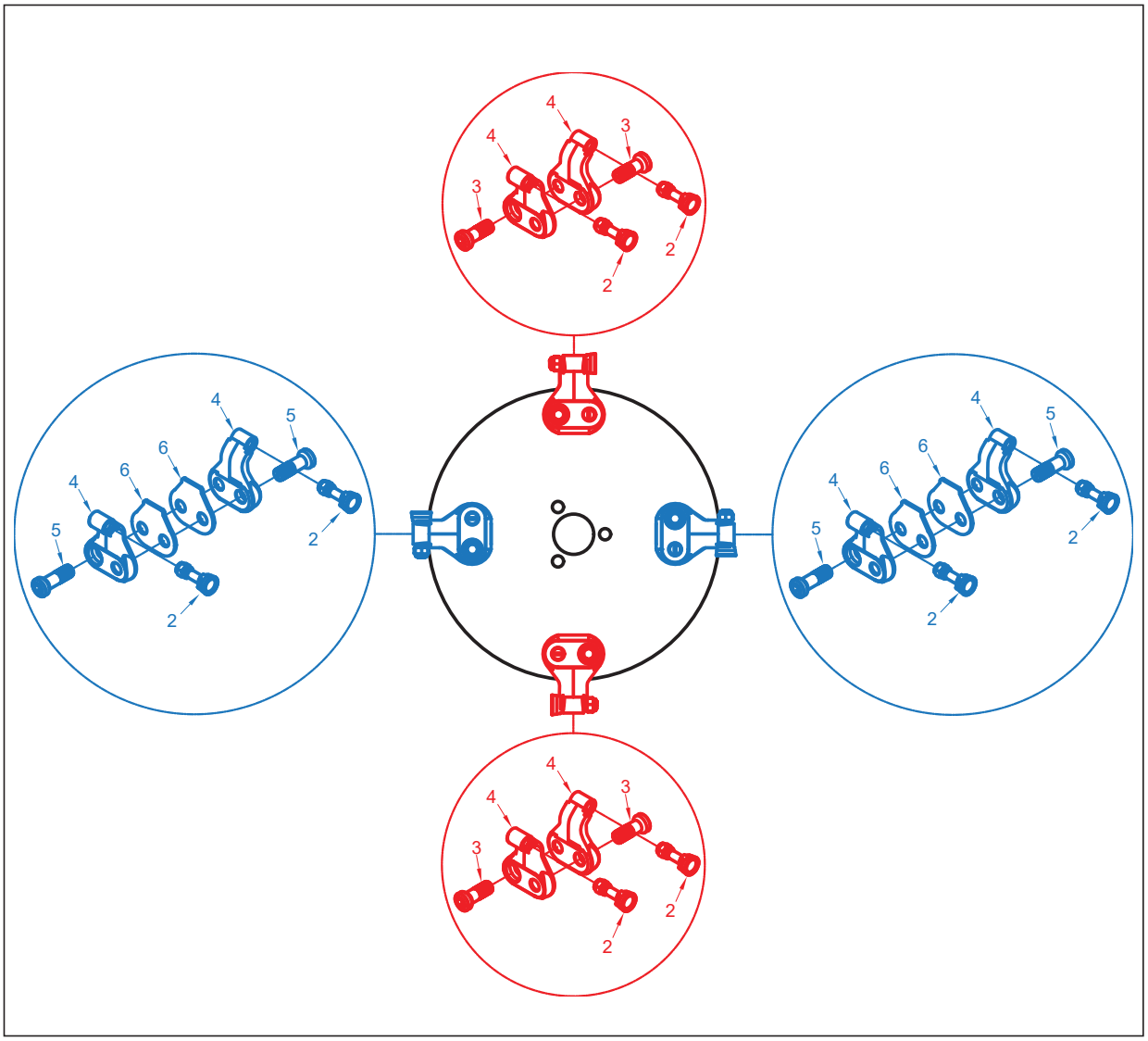


CUTTER WHEEL SIDE

#	Part Number	Description
1	208-2000-35	Beltshield Cover
2	900-1908-36	Belt
3	900-1924-28	Jack Shaft Sheave Bushing
4	200-300087	Key for Jack Shaft Sheave Bushing
5	900-1924-37	Jack Shaft, Idler, & Cutter Wheel Sheave
6	900-4906-98	Bolt for Idler Bushing
7	900-1926-33	Idler Sheave Bushing
8	900-1903-13	Cutter Wheel Sheave Bushing
9	963-3005-84	Key for Cutter Wheel Sheave Bushing
10	208-3001-57	Dust Cover
11	208-3000-43	Jack Shaft
12	208-2000-33	Beltshield Backer
13	208-2000-34	Idler Sheave Tensioner Plate
14	900-4910-68	Idler Sheave Adjuster Bolt
	900-4906-56	Nut for Idler Sheave Adjuster Bolt
15	900-1928-29	Cutter Wheel Bearing
16	208-2000-28	Cutter Wheel Bar Assembly
17	208-2000-18	Cutter Wheel Bar Mount
18	900-1924-80	Cutter Wheel Bar Mount Bushing

#	Part Number	Description
19	208-3001-43	Cutter Wheel Bar Linkage
20	208-1000-18	Cutter Wheel Frame Assembly
	208-2000-32	Cutter Wheel Frame Weldment
21	900-4906-84	Cutter Wheel Shaft Nut
22	See Pages 40 - 41	Cutter Wheel Assembly
23	208-3000-35	Cutter Wheel Shaft
24	900-4906-73	Cutter Wheel Shaft Bolt
25	955-300086	Lock Pin
26	900-7900-96	Lock Pin Rubber Handle
27	208-3000-26	Lift Cylinder Pin
28	900-3941-35	Lift Cylinder
29	208-2000-52	Pivot Assembly
30	900-1902-42	Bushing for Swing Cylinder
31	900-3958-80	Swing Cylinder
32	208-2000-37	Chip Pan - Right Side
33	208-2000-36	Chip Pan - Left Side
34	208-3001-53	Chip Curtain - Large
35	208-3001-55	Chip Curtain Strap - Right Side
36	208-3001-54	Chip Curtain Strap - Left Side
37	208-3001-56	Chip Curtain - Small

GREEN TEETH CUTTER WHEEL

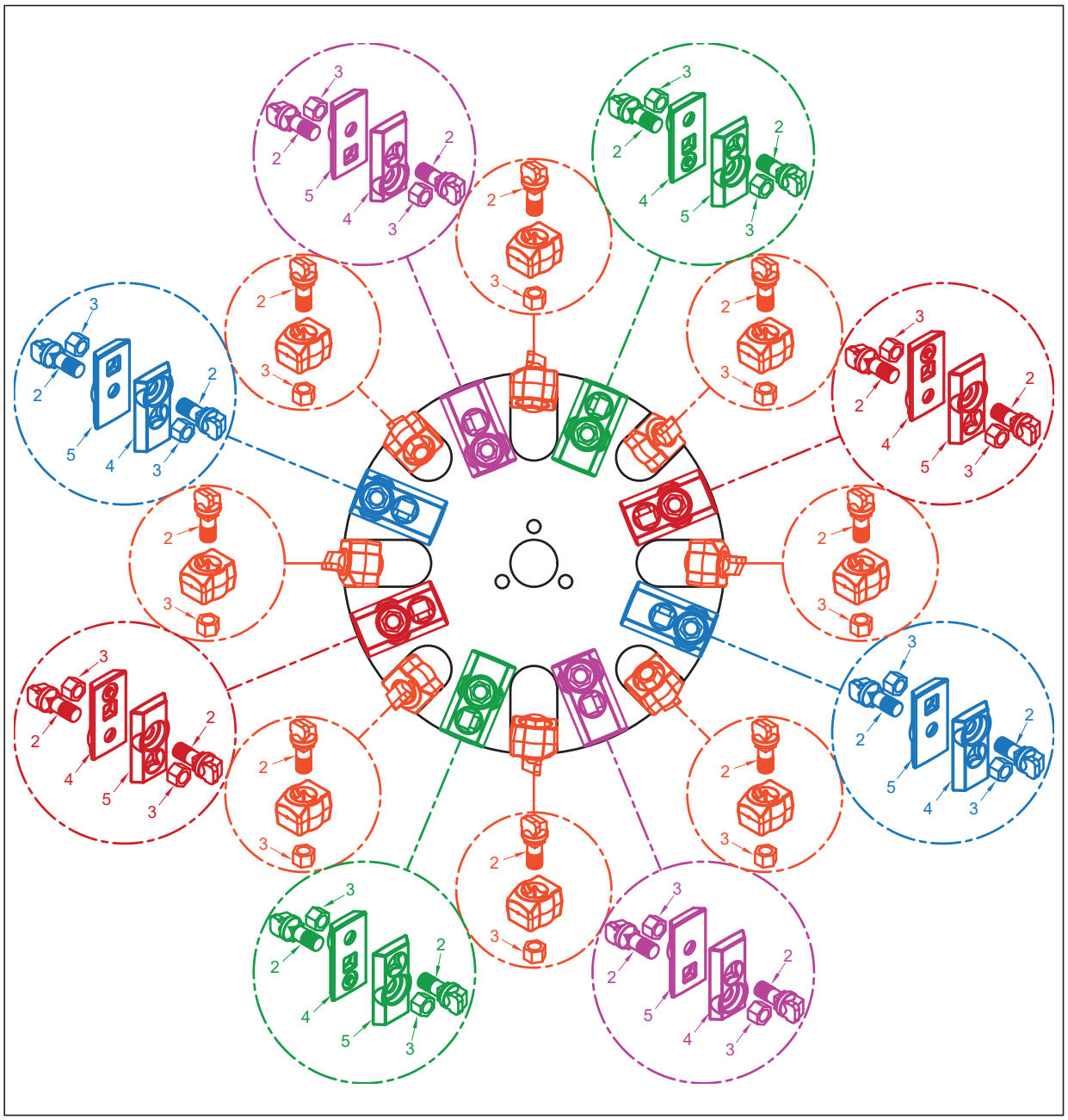


#	Part Number	Description
1	208-1000-05	Green Teeth Cutter Wheel Assembly (Includes 7)
2	900-9926-71	WearSharp Tooth
	900-9937-58	WearSharp Tooth Nut
	900-9937-59	WearSharp Tooth Nut Spacer

#	Part Number	Description
3	900-9907-42	Pocket Bolt (Without Spacers)
4	900-9907-86	Angle Pocket
5	900-9916-03	Pocket Bolt (With Spacers)
6	900-9938-57	Pocket Spacer
7	900-9938-33	8 Tooth Kit

Pocket Bolt Torque - Lubricated: 180 ft-lbs (244 Nm)
Pocket Bolt Torque - Dry 240 ft-lbs (325 Nm)
Green Teeth Nut Torque: 35 ft-lbs (47 Nm)

NEW RIVER “REVOLUTION” CUTTER WHEEL

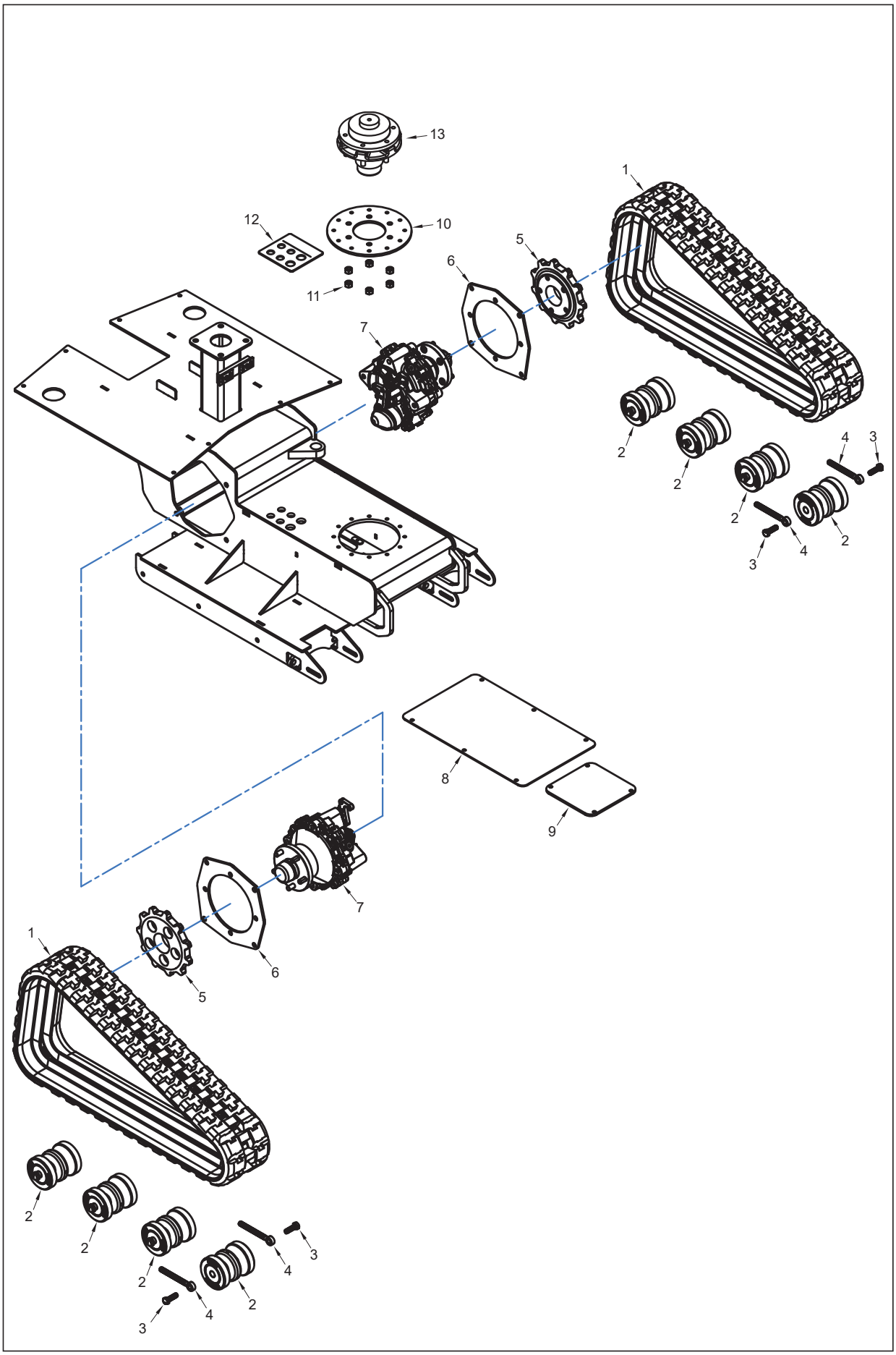


#	Part Number	Description
1	900-9958-31	New River “Revolution Wheel” Assembly (Includes 2 - 6)
2	900-9912-22	Lead & Side Hex Tooth

#	Part Number	Description
3	900-9909-99	Tooth Nut
4	900-9912-25	Pocket with Locator Pin
5	900-9912-26	Pocket without Locator Pin

Revolution Tooth Nut Torque: 150 ft-lbs (203 Nm)

FRAME

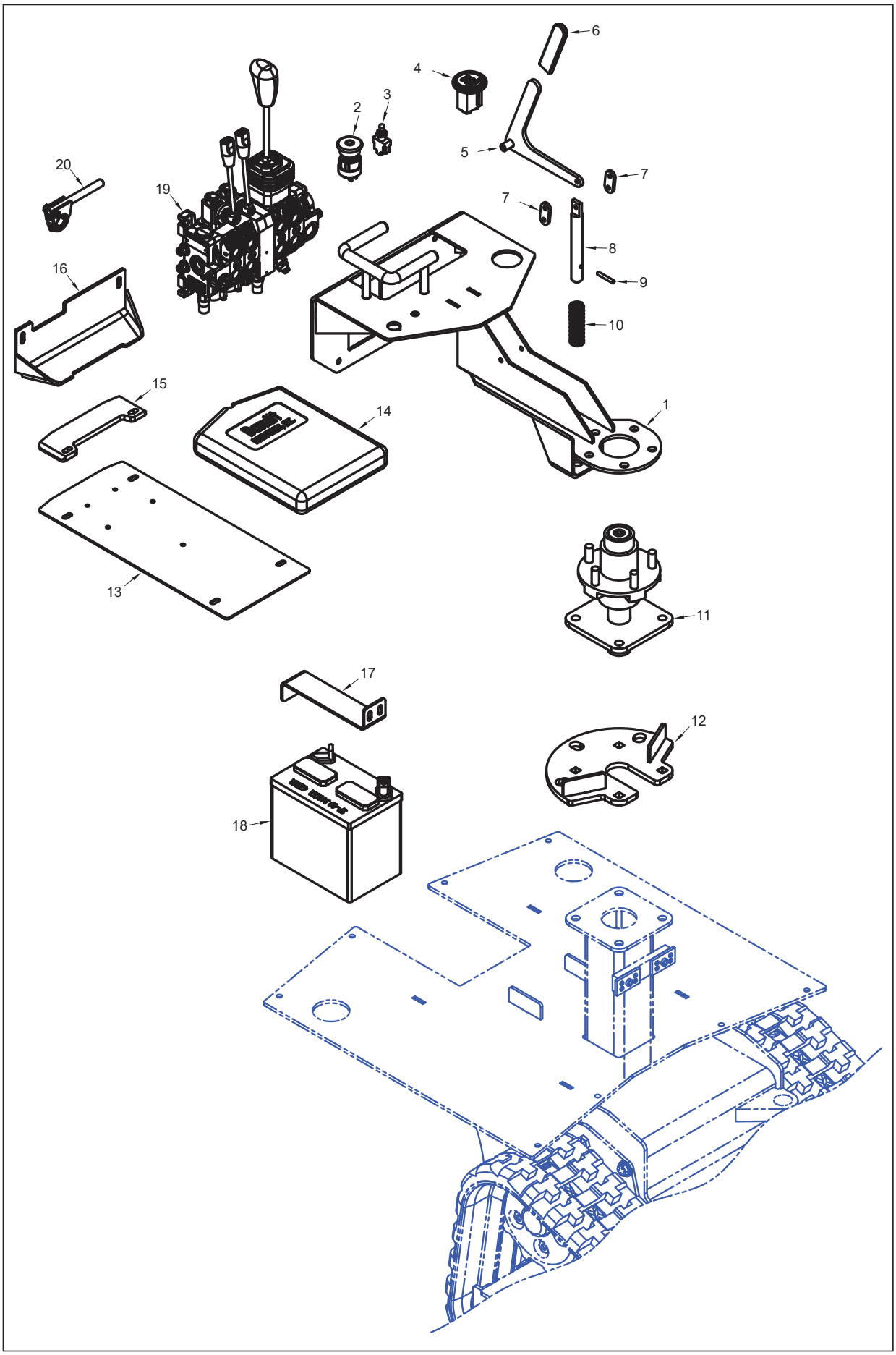


FRAME

#	Part Number	Description
1	900-5914-89	Rubber Track
2	900-5914-27	Track Roller
3	900-4923-96	Track Roller Adjuster Bolt
4	900-4902-73	Track Roller Adjuster
	900-4906-82	Track Roller Adjuster Nut
5	208-3002-25	Track Drive Sprocket
6	208-3002-19	Track Drive Motor Mount Plate
7	900-3978-18	Track Drive Motor
8	208-3002-23	Drive Motor Access Cover
9	208-3002-64	Pivot Access Cover
10	208-3001-86	Pivot Hub Plate
11	900-4909-41	Pivot Hub Nut
12	208-3001-13	Bulkhead Plate

#	Part Number	Description
13	208-1000-29	Spindle & Hub Assembly
	900-5917-63	Hub Kit Only
	900-5917-71	Jam Nut
	900-5917-72	Cup & Stud Outer Hud
	900-4914-00	Cone Nut
	900-5911-75	Spindle Nut Retainer
	900-6916-90	Dust Seal
	900-5905-30	Dust Cap
	900-1919-46	Inner/Outer Bearing
	900-5911-97	Outer Bearing Cone
	900-5911-13	Rubber Plug for Grease Cap
	900-5912-70	“D” Washer

SWING OUT CONSOLE

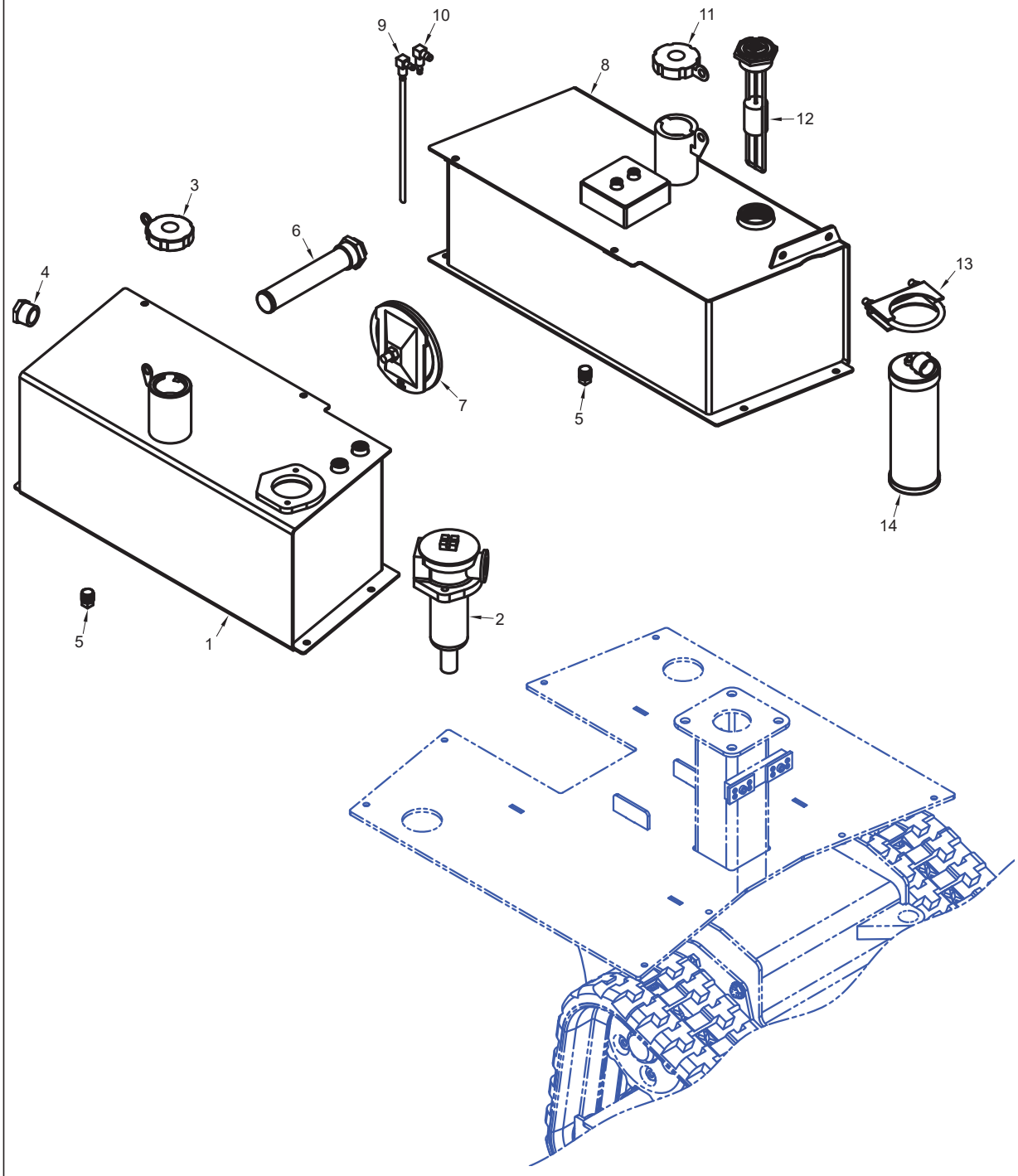


SWING OUT CONSOLE

#	Part Number	Description
1	208-2000-12	Swing Out Arm Assembly
2	900-2931-47	Emergency Stop
3	900-2910-93	Cutter Wheel On/Off Switch
4	900-2936-44	Hour Meter
5	208-2000-14	Swing Out Arm Lock Handle
6	900-9906-75	Rubber Grip for Swing Out Arm Lock Handle
7	996-3007-25	Swing Out Arm Lock Linkage
8	208-3000-60	Swing Out Arm Lock Pin
9	900-4923-40	Swing Out Arm Lock Spring Pin
10	900-4923-61	Swing Out Arm Lock Spring

#	Part Number	Description
11	900-5912-79	Swing Out Arm Spindle
	900-5915-82	Grease Cap for Spindle
	900-5911-99	Inner & Outer Bearing for Spindle
	900-5912-00	Inner & Outer Bearing Cup for Spindle
	010-060-00	Inner & Outer Seal for Spindle
12	208-2000-13	Swing Out Arm Lock Plate
13	208-3000-68	Tank Spacer Cover
14	900-9910-28	Manual Holder
15	208-3001-01	Swing Out Arm Slide
16	208-3001-00	Swing Out Arm Support
17	208-3000-66	Battery Strap
18	900-6911-34	Battery
19	900-3981-98	Hydraulic Valve
20	208-2000-60	Reverse Limiter

FUEL & HYDRAULIC TANK



FUEL & HYDRAULIC TANK

#	Part Number	Description
1	208-1000-09	Hydraulic Tank Assembly
	208-2000-10	Hydraulic Tank Weldment
2	900-3951-31	Hydraulic Filter Assembly
	900-3951-32	Hydraulic Filter Only
	900-3994-62	Hydraulic Filter Cap Only
3	900-3988-07	Locking Fill Cap - Hydraulic Tank Only
4	900-3900-44	Sight Gauge
5	900-3921-01	Drain Plug
6	900-3944-78	Tank Strainer
7	900-3980-29	Tank Clean-Out Cover

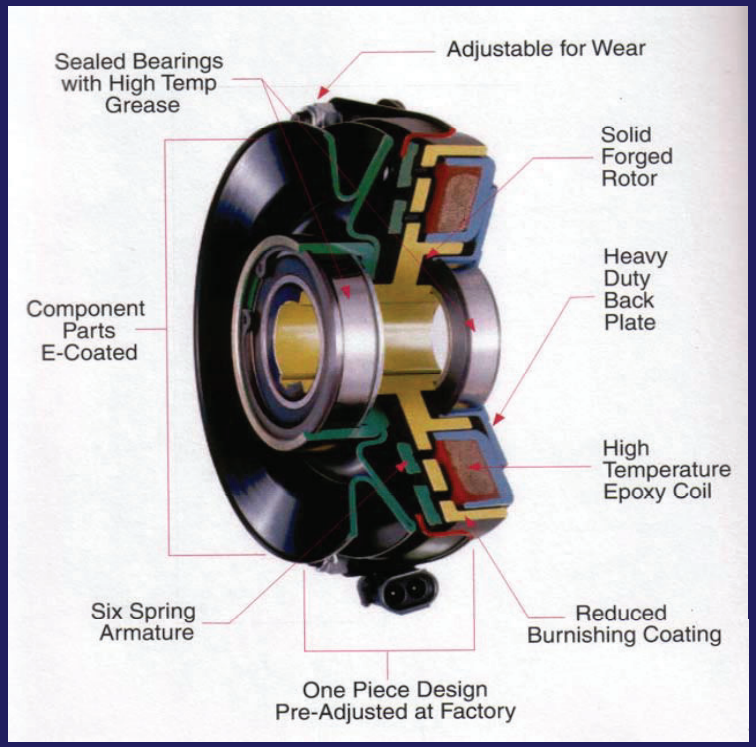
#	Part Number	Description
8	208-1000-08	Fuel Tank Assembly (Includes 9 - 14)
	208-2000-09	Fuel Tank Weldment
9	900-3909-04	1/4” NPT 90° Fuel Supply Line
	900-3909-03	Drop Pipe
10	900-3936-69	1/4” NPT 90° Fuel Return Line
11	900-3988-32	Locking Fill Cap - Fuel Tank Only
12	900-2929-09	8” Sight Gauge
13	900-6910-94	Cannister Clamp
14	900-3967-53	Carbon Canister

SERVICE RECORD

DATE	DESCRIPTION	AMOUNT


PTO
Clutch/Brake
Installation and
Maintenance
Ogura Industrial Corporation
2006

Ogura Design




Outline
Pre-Installation
Installation
Maintenance
Ogura Industrial Corporation
2006


Pre-Installation
Ogura Industrial Corporation
2006

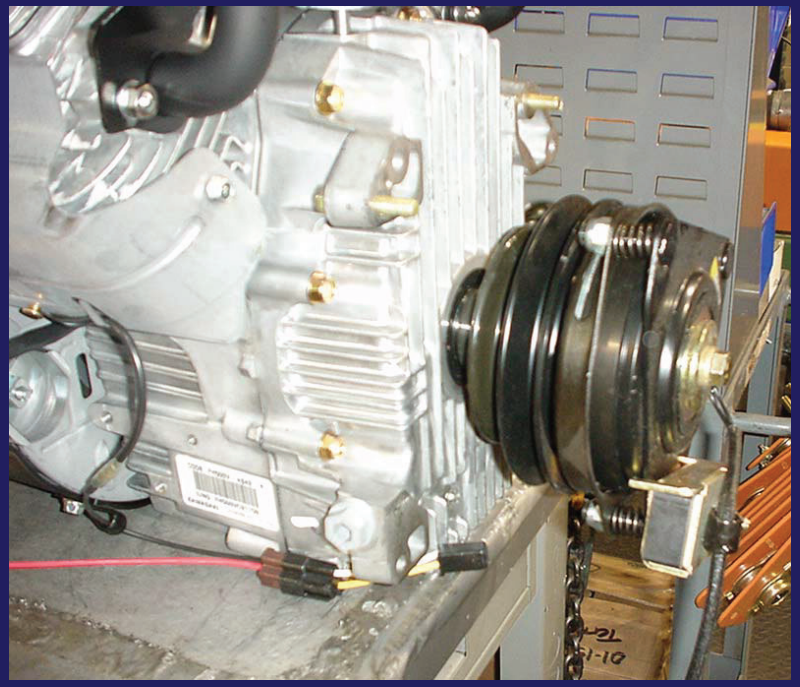
Pre-Installation Check

- Engine Shaft
- Key Length and Height
- Direction of Rotation
- Backing Plate Restraint

Pre-Installation Check

Engine Shaft

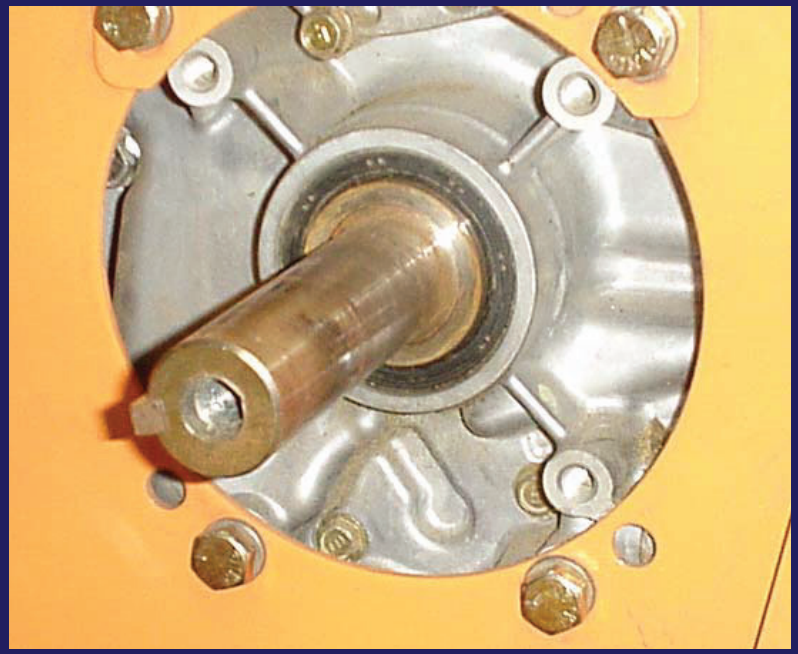
- PTO clutches are almost always mounted on engine shaft



Pre-Installation Check

Engine Shaft

- Shaft should be long enough to support clutch
  - Minimum shaft length = bore diameter



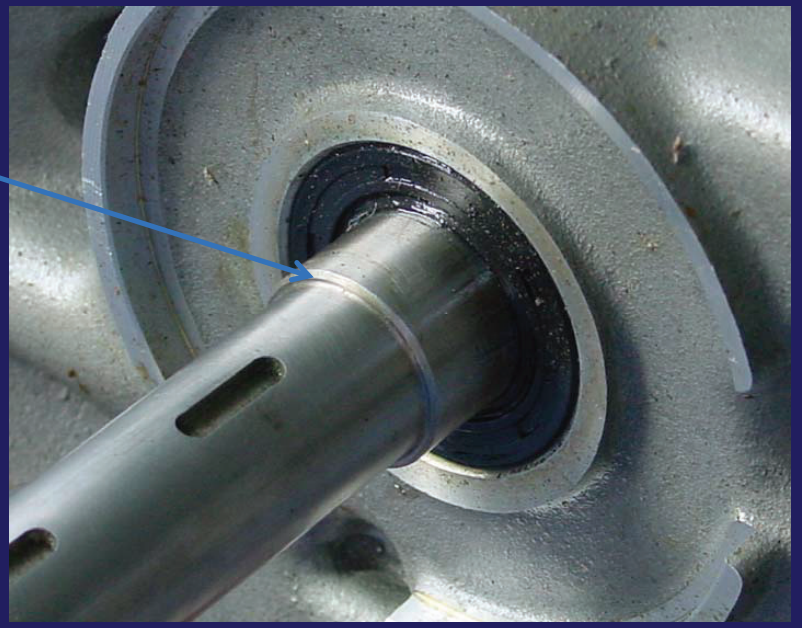
Pre-Installation Check

Engine Shaft

- For two-piece design, both halves need shaft support

Pre-Installation Check
Engine Shaft

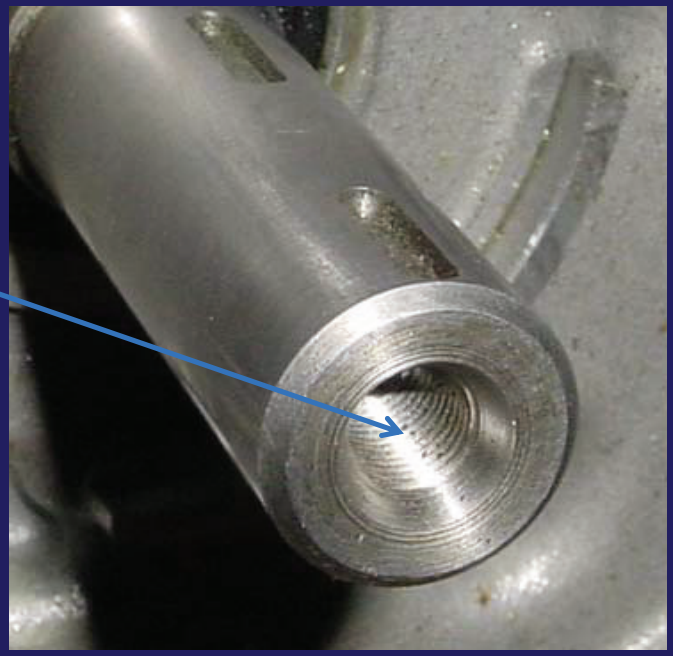
- Engine shaft needs step



Pre-Installation Check

Engine Shaft

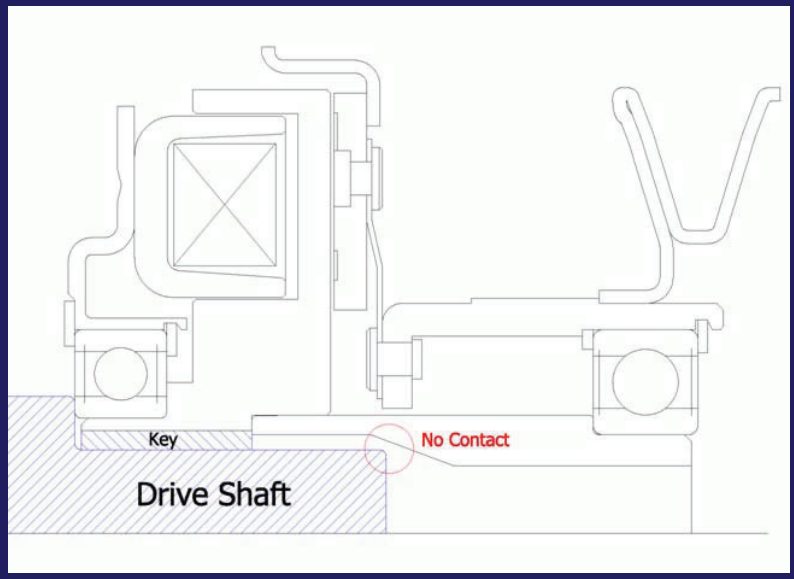
- Engine shaft needs to be tapped



Pre-Installation Check

Key Length and Height

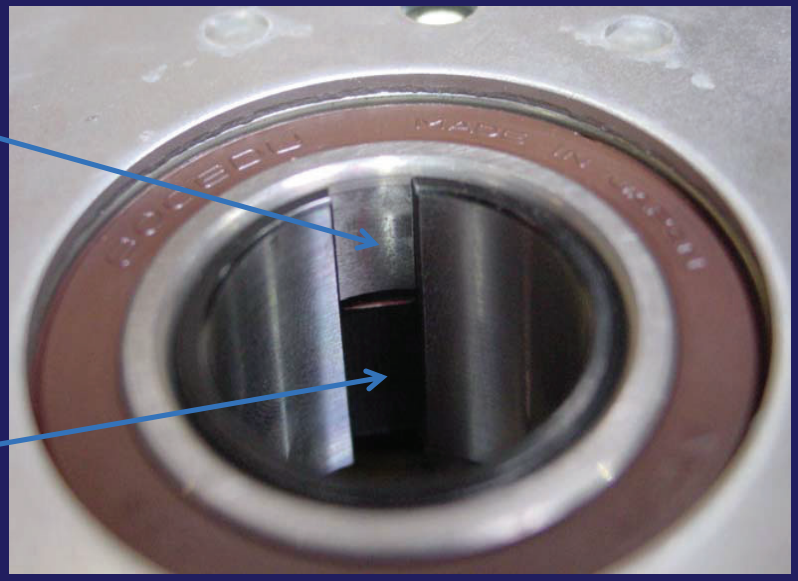
- For clutch without through- keyway (keyway in rotor only), key should be short enough that it will not hit pulley bearing carrier



Pre-Installation Check

Key Length and Height

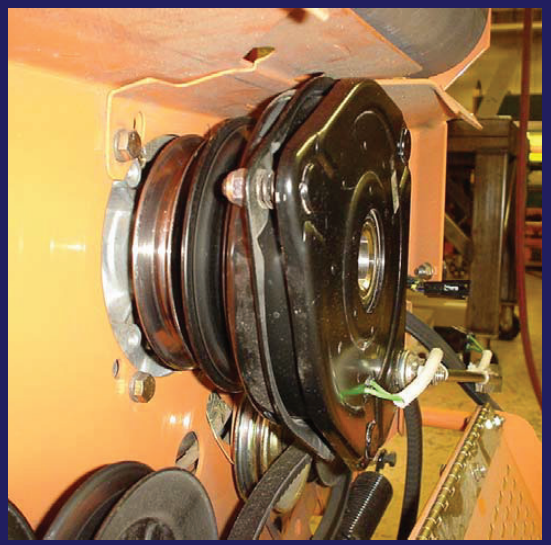
- For clutch with open keyway on field-side bearing race, key may need reduced height



Pre-Installation Check

Direction of Rotation

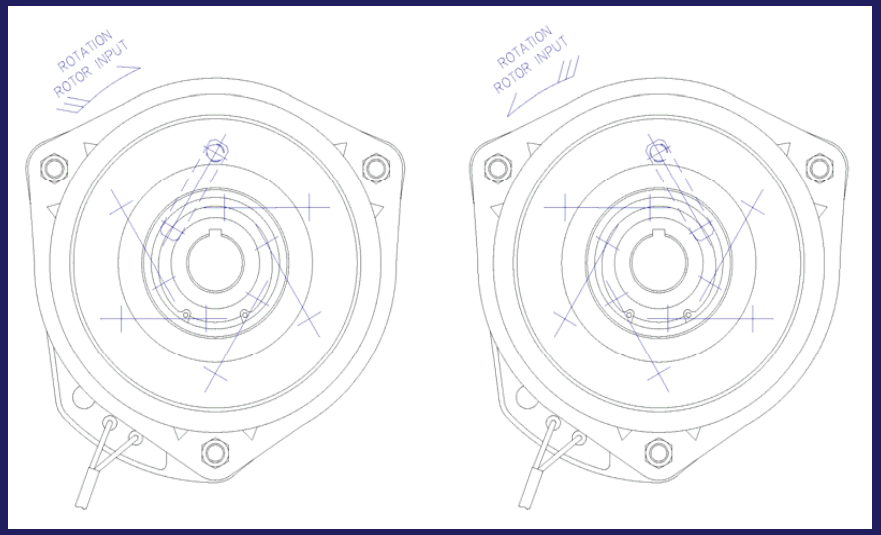
- Clutches can mount with pulley facing toward or away from engine



Pre-Installation Check

Direction of Rotation

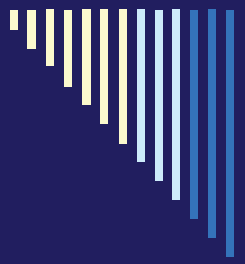
- Leaf springs are set at factory to run either clockwise or counter-clockwise



Pre-Installation Check

Direction of Rotation

- Check direction of rotation to verify that spring direction is correct
- Springs should operate in tension and not compression
  (most engines rotate counterclockwise)



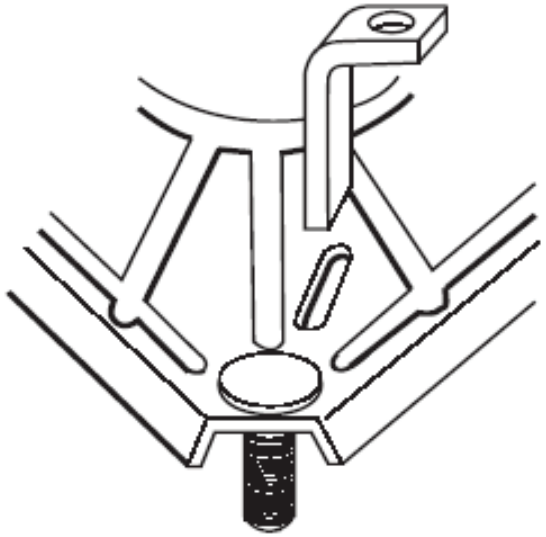
Pre-Installation Check

Backing Plate Restraint

- PTO backing plate only needs to withstand brake force
  - This can be 2 ~ 10 ft-lbs depending on clutch size

Pre-Installation Check

Backing Plate Restraint

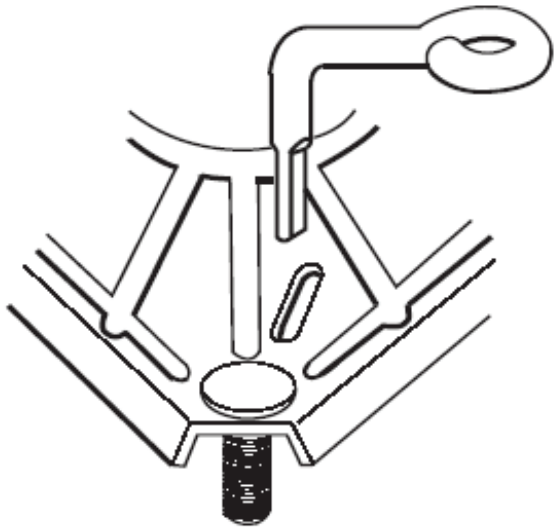


(Figure 11)
1/4" x 5/8" Bent Flat
Steel Field Restraint

- Tab Type

Pre-Installation Check

Backing Plate Restraint

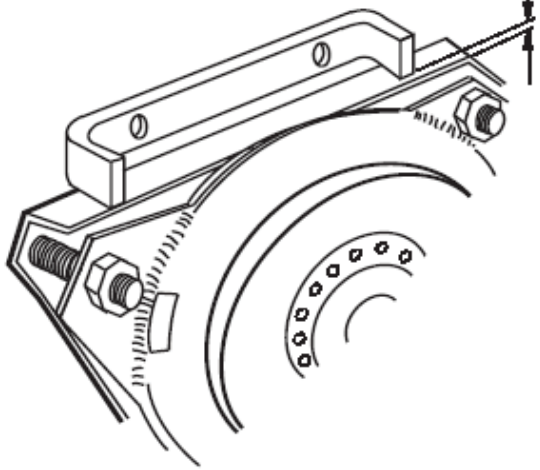


(Figure 12)
5/16" Diameter Bent Steel
Rod Field Restraint

- Rod Type

Pre-Installation Check

Backing Plate Restraint



(Figure 14)
1/8" x 3/4" Bent Flat Steel Restraint

- Flat Type

Pre-Installation Check

Backing Plate Restraint

- Rubber Bushing Type


Installation
Ogura Industrial Corporation
2006

PTO Clutch Installation

① Verify appropriate shaft/pulley for clutch

② Set key in shaft keyway if required (some clutches have internal key)

③ Slide clutch onto shaft

④ Verify good contact with face of bearing inner ring

⑤ Tighten center bolt and washer

⑥ Verify backing plate has slight axial and radial freedom

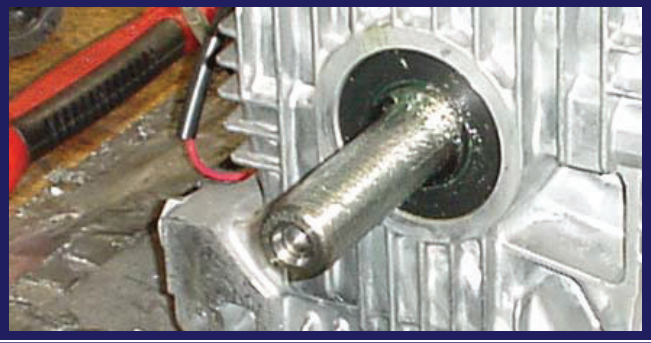
⑦ Connect power

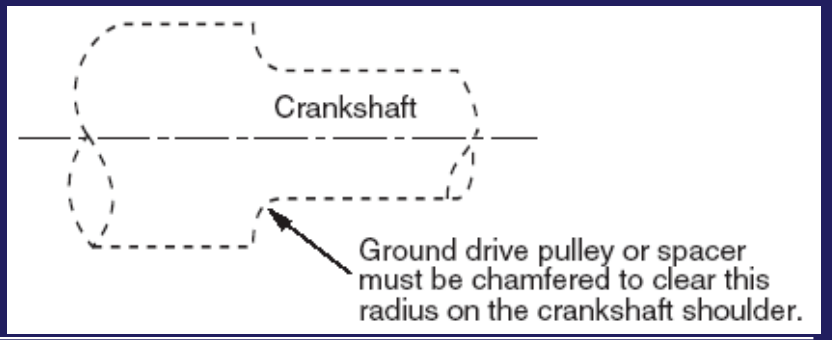
⑧ Burnish clutch

PTO Clutch Installation #1

Installing Pulley

- Most installations require drive pulley to be installed before clutch
- Pulley must not contact radius of shaft shoulder
  - Pulley must sit against shoulder face, otherwise center bolt could become loose

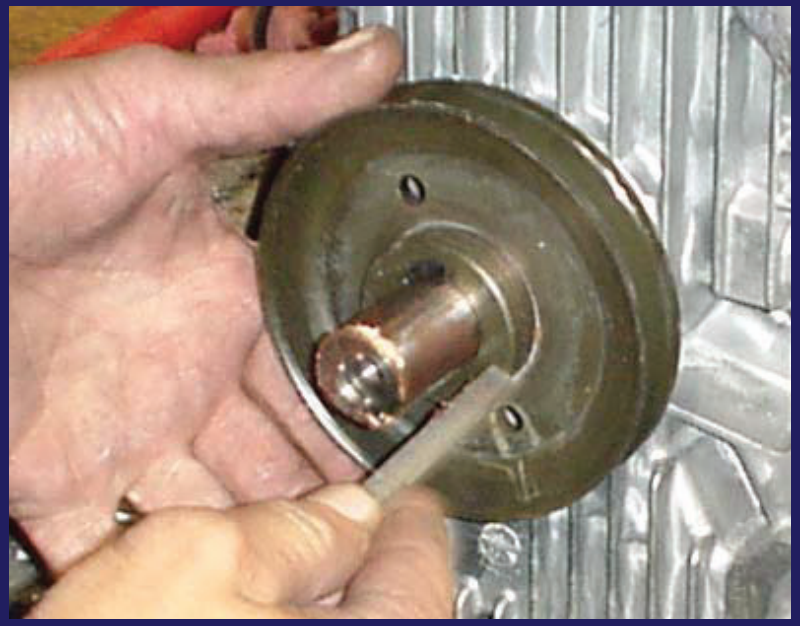




PTO Clutch Installation #2

Installing Key

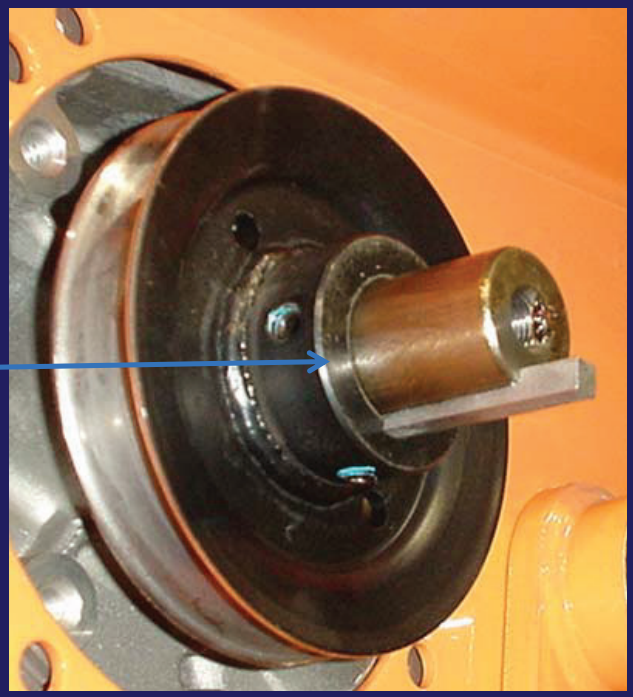
- If clutch requires key, first set key in key way on shaft, then mount clutch (some clutches have internal key)
- Do not force clutch onto shaft or it will damage bearing races



PTO Clutch Installation #4

Mounting Clutch

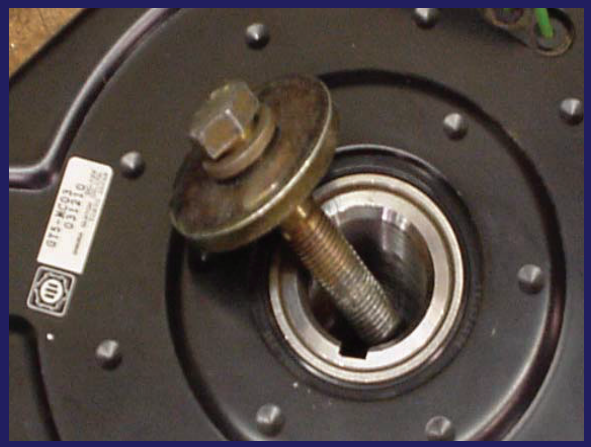
- Clutch should be mounted such that bearing race makes contact with:
  - Shaft step
  - Drive pulley
  - Washer
  - All faces must be normal to shaft within 0.003”



PTO Clutch Installation #5

Installing Center Bolt

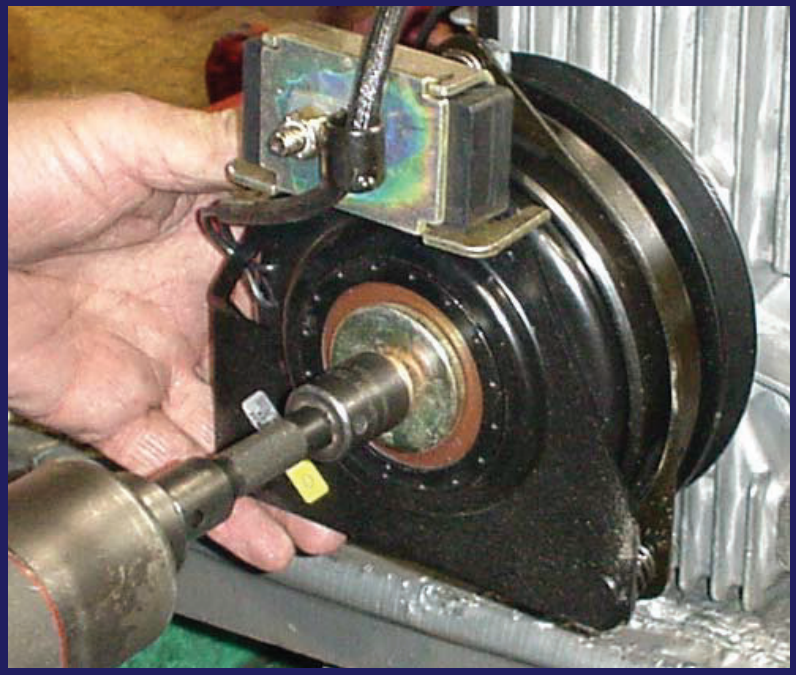
- Install center bolt and washer on end of tapped shaft
- Washer should be about 0.250” thick with OD ≥ ID of bearing inner ring



PTO Clutch Installation #5

Installing Center Bolt

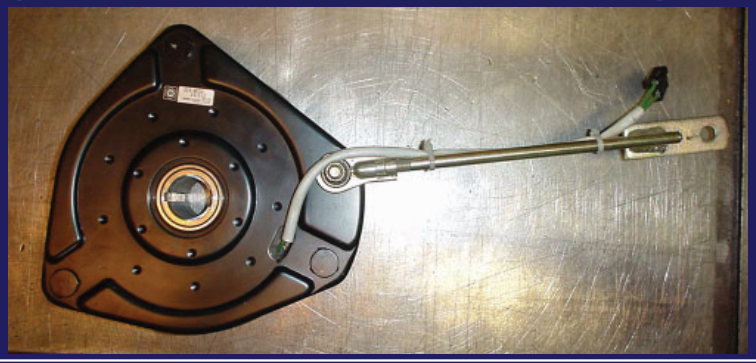
- Center bolt tightening torque is based on bolt grade
  - Torque should be about 30 ~ 55 ft-lbs
- In diesel or heavy vibration application, adhesive should be used to lock bolt in place

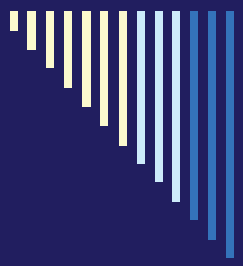


PTO Clutch Installation #6

Installing Restraint

- Install backing plate restraint
  - If pin or slot type is used, restraint may already be on machine frame or engine face
- After mounting, verify slight axial and radial movement is present ($^1/_{16}$" ~ $^1/_8$")
  (very important to avoid field bearing failure)





PTO Clutch Installation #7

Connecting Power

- Attach terminal housing on clutch lead wire to corresponding power terminal
- Turn on electrical power on mower without starting engine if possible
- Turn on PTO switch to verify clutch pulls in
  - Clutch will make “click” sound at engagement

PTO Clutch Installation #8

Burnishing

- What is it?
  - Wearing/mating of armature and rotor surfaces
- Why is it important?
  - To achieve greater initial torque
- How is it done?
  - Cycle clutch 20 ~ 50 times lightly loaded at under 2,000 rpm

Burnishing Recommendations

Deck Size	Cycles	On/Off
32” ~ 42”	25 ~ 50	10 / 5 sec
48” ~ 52”	25 ~ 50	10 / 10 sec
61”	25 ~ 50	10 / 15 sec
72”	25 ~ 50	10 / 20 sec


Maintenance
Ogura Industrial Corporation
2006

Maintenance

- Most clutch parts do not require maintenance and can not be replaced
  - Bearings are sealed for life of clutch
  - Armature, rotor, and brake wear evenly and can not be replaced individually
  - Coil can not be removed

Adjustment for Wear

- All Ogura one-piece clutches are adjusted at factory (no initial adjustment required)
- As adjustable clutches wear, they can be re-gapped to extend overall life

Adjustment for Wear

- If clutch fails to pull in or will not continue to pull in when hot, air gap may need adjustment
- To make adjustments, taking PTO off mower may be easier
- Necessary equipment
  - 0.015”~0.022” feeler gauge
  - $^{9}/_{16}$” open-end box wrench

Adjustment for Wear

- Identify clutch model from label located on back of field
- There are three inspection slots on brake shroud
- Place feeler gauge in slot between armature and rotor
- Slowly tighten brake nut until armature and rotor contact feeler gauge

Adjustment for Wear

- Almost all Ogura clutches use 24UNF brake bolt, thus one turn of brake nut equates to approximately 0.04” of axial movement
  (for reference only: feeler gauge is still required)

Adjustment for Wear

Ogura Industrial Corporation

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Adjustment for Wear

Model Type	Air Gap Range
GT1, GT1A	0.012” ~ 0.024”
GT2, GT2.5	0.015” ~ 0.024”
GT3.5, GT4, GT5	0.016” ~ 0.024”

Adjustment for Wear

- Setting gap towards low range will increase cycle life between adjustments
- Caution: do not set gap below minimum or clutch may be damaged
- Once gap is set, rotate armature and rotor, check gap with feeler gauge, and make adjustments as required

Adjustment for Wear

- Apply full voltage to clutch
- Rotate armature and rotor to verify no contact between armature and brake shroud
- If there is contact, back off brake nuts and retry until there is no contact

Thank You

EVERYTHING ABOUT AN OGURA CLUTCH WORKS

For more information on Ogura clutches, visit us on the web at

www.ogura-clutch.com